

HEALTH AND SAFETY PLAN

GROUNDWATER WELL INSTALLATION

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

October 4, 2006

PREPARED FOR

BOEING REALTY CORPORATION
4900 East Conant Street, Bldg. 1
Mail Stop MC D001-0097
Long Beach, CA 90808

PREPARED BY

Avocet Environmental, Inc.
16 Technology Drive, Suite 154
Irvine, California 92618-2327

Project No. 1155.001



**Health and Safety Plan
Groundwater Well Installation**

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 1
October 4, 2006

HASP AUTHORIZATION

The undersigned have reviewed this Health and Safety Plan (HASP) and recognize that when this form is completed, the attached HASP is approved for field activities at the above-referenced site. Changes to the HASP shall be documented in writing and approved by the Avocet Health and Safety Director.

PLAN PREPARED BY:

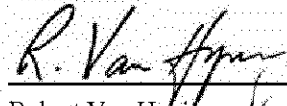


Chris Rose
Staff Engineer

09/07/06

Date

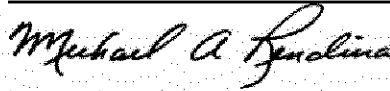
PLAN APPROVED BY:



Robert Van Hyning
Health & Safety Director

9/15/06

Date



Michael A. Rendina
Project Manager

09/15/06

Date

PLAN REVISED BY:

Name

Date

REVISION APPROVED BY:

Health & Safety Director

Date

Project Manager

Date



**Health and Safety Plan
Groundwater Well Installation**

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page ii
October 4, 2006

TABLE OF CONTENTS

	<u>Page</u>
HASP AUTHORIZATION.....	i
LIST OF TABLES	v
LIST OF FIGURES	v
LIST OF ABBREVIATIONS AND ACRONYMS	vi
1.0 OVERVIEW AND SUMMARY	1
1.1 SITE INFORMATION	1
1.2 CHEMICALS IN THE SUBSURFACE	1
1.3 PURPOSE OF HASP	2
1.4 MINIMUM PPE	3
1.5 SAFE WORKING PRACTICES	3
1.6 NEAREST HOSPITAL	3
1.7 HASP ORGANIZATION	4
2.0 SITE-SPECIFIC BACKGROUND INFORMATION.....	5
2.1 FACILITY LOCATION	5
2.2 FACILITY DESCRIPTION	5
2.3 PREVIOUS ENVIRONMENTAL INVESTIGATIONS	5
2.3.1 Phase I ESA in 1996	5
2.3.2 Phase II Soil Investigation in 1997	6
3.0 HASP OBJECTIVES AND IMPLEMENTATION	8
3.1 HASP OBJECTIVES	8
3.2 HASP IMPLEMENTATION	8
3.3 PRE-PROJECT CHECKLIST	9
3.4 TAILGATE MEETINGS	10
4.0 ACTION LEVELS AND PPE REQUIREMENTS	11
4.1 EXPOSURE LEVELS	11
4.2 RESPIRATORY PROTECTION ACTION LEVELS	11
4.3 PERSONAL PROTECTIVE EQUIPMENT	12
4.4 AIR QUALITY MONITORING	12
4.5 PERSONAL AIR QUALITY MONITORING	13
5.0 EMERGENCY TELEPHONE NUMBERS	14
6.0 HOSPITAL INFORMATION	16
7.0 GENERAL HASP OBJECTIVES	17
7.1 WORK ACTIVITIES	17
7.2 IMPLEMENTATION AND MODIFICATION OF THE HASP	18

**Health and Safety Plan
Groundwater Well Installation**

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page iii
October 4, 2006

	<u>Page</u>
8.0 PROJECT ORGANIZATION AND COORDINATION.....	19
8.1 HEALTH AND SAFETY DIRECTOR	19
8.2 PROJECT MANAGER	19
8.3 SITE SAFETY OFFICER	19
8.4 WORK PARTY	20
8.5 CONTRACTORS	21
9.0 CODE OF SAFE WORK PRACTICES	22
10.0 TASK HAZARDS AND REQUIRED CONTROL MEASURES.....	25
10.1 ACOUSTIC HAZARDS	25
10.2 BIOLOGICAL HAZARDS	25
10.3 CONFINED SPACE/OXYGEN DEFICIENCY HAZARDS	26
10.4 ELECTRICAL HAZARDS	26
10.5 MECHANICAL HAZARDS	27
10.6 MEDICAL HAZARDS	28
10.6.1 Chemical Exposures	28
10.6.2 Temperature Hazards	28
10.7 PHYSICAL HAZARDS	30
10.8 EXPLOSIVE HAZARDS	31
10.9 OTHER HAZARDS	31
11.0 AIR QUALITY MONITORING	33
11.1 PERSONAL AIR QUALITY MONITORING	33
11.2 COMBUSTIBLE GASES AND EXPLOSIVE AND OXYGEN DEFICIENT/ENRICHED ATMOSPHERES	33
12.0 PERSONAL PROTECTIVE EQUIPMENT	34
12.1 RESPIRATORY PROTECTION UPGRADE GUIDELINES	34
12.1.1 Respirator and Cartridges	36
12.2 LEVEL D PPE	36
12.3 LEVEL C PPE	37
12.4 LEVEL B PPE	37
12.5 LEVEL A PPE	37
12.6 ADDITIONAL SAFETY EQUIPMENT	38
13.0 DESIGNATED WORK AREAS	39
13.1 SUPPORT ZONE	39
13.2 CONTAMINATION REDUCTION ZONE	39
13.3 EXCLUSION ZONE	39
14.0 DECONTAMINATION PROCEDURES	41
14.1 PERSONNEL	41
14.2 EQUIPMENT	41

**Health and Safety Plan
Groundwater Well Installation**

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page iv
October 4, 2006

	<u>Page</u>
15.0 WASTE MANAGEMENT	42
16.0 SANITATION FACILITIES	43
17.0 SITE SECURITY AND CONTROL	44
17.1 SITE SECURITY	44
17.2 WORK HOURS	44
17.3 AFTER HOURS/WEEKEND OPERATIONS	44
18.0 TRAINING AND MEDICAL SURVEILLANCE REQUIREMENTS	45
18.1 HAZARDOUS WASTE OPERATIONS TRAINING	45
18.2 HAZARD COMMUNICATION PROGRAM	45
18.3 SITE-SPECIFIC PRE-JOB TRAINING	46
18.4 DAILY SITE SAFETY TRAINING	46
18.5 MEDICAL SURVEILLANCE	46
19.0 EMERGENCY RESPONSE PLAN	47
19.1 PRE-EMERGENCY PLANNING	47
19.2 PERSONNEL ROLES, LINES OF AUTHORITY, AND COMMUNICATION	47
19.3 EMERGENCY RECOGNITION AND PREVENTION	47
19.4 SITE RESOURCES/EMERGENCY EQUIPMENT	47
19.5 EMERGENCY SIGNALS	47
19.6 SAFE DISTANCES AND PLACES OF REFUGE	48
19.7 EMERGENCY SITE SECURITY AND CONTROL	48
19.8 SITE EVACUATION ROUTE	48
19.9 CONTINGENCY PROCEDURES	49
19.9.1 Cave-In	49
19.9.2 High VOC Levels in Work Zone	49
19.9.3 High VOC Levels at Site Perimeter	49
19.9.4 Fire	49
19.9.5 Flash Flood	50
19.9.6 Material Spills	50
19.9.7 Earthquake	51
19.9.8 Severe Weather	51
19.9.9 Vehicle Accidents	51
19.9.10 Workplace Violence	52
19.9.11 Emergency Decontamination Procedures	52
19.10 EMERGENCY MEDICAL TREATMENT AND FIRST AID	52
19.11 EMERGENCY ALERTING AND NOTIFICATION PROCEDURES	53

TABLES

FIGURES

APPENDIX A: STANDARD FORMS

APPENDIX B: MSDS AND NIOSH CHEMICAL HAZARD SHEETS



**Health and Safety Plan
Groundwater Well Installation**

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page v
October 4, 2006

LIST OF TABLES

<u>Table No.</u>	<u>Title</u>
1	Project Work Activities and Hazards Identification
2	Chemical Toxicity and Exposure Information

LIST OF FIGURES

<u>Figure No.</u>	<u>Title</u>
1	Facility Location Map

Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page vi
October 4, 2006

LIST OF ABBREVIATIONS AND ACRONYMS

ACGIH	American Conference of Governmental Industrial Hygienists
ANSI	American National Standard Institute
APR	air-purifying respirator
AST	aboveground storage tank
bgs	below ground surface
BRC	Boeing Realty Corporation
Cal/OSHA	California Occupational Safety and Health Administration
CHEMTREC	Chemical Transportation Emergency Center
COC	chemical of concern
CPR	cardiopulmonary resuscitation
DAC	Douglas Aircraft Company
dBa	decibels, A-scale
1,1-DCA	1,1-dichloroethane
1,1-DCE	1,1-dichloroethylene
cis-1,2-DCE	cis-1,2-dichloroethylene
DNAPL	dense non-aqueous phase liquid
ESA	environmental site assessment
GFCI	ground fault circuit interrupters
HASP	Health and Safety Plan
HSD	Health and Safety Director
IDLH	immediately dangerous to life and health
KJC	Kennedy/Jenks Consultants
LARWQCB	California Regional Water Quality Control Board, Los Angeles Region
LEL	lower explosive limit
LFC	lowest feasible concentration
LNAPL	light non-aqueous phase liquid
MEK	2-butanone
mg/kg	milligram per kilogram
MSDS	Material Safety Data Sheet
MSHA	Mine Safety and Health Administration
MUL	maximum use limit
NFA	no further action
NIOSH	National Institute for Occupational Safety and Health
NRC	National Response Center
OSHA	U.S. Occupational Safety and Health Administration
OVM	organic vapor meter
PEL	permissible exposure limit
PF	protection factor
PID	photoionization detector
PPE	personal protective equipment

Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page vii
October 4, 2006

ppm	part per million
REL	recommended exposure level
RQ	reportable quantity
SCBA	self-contained breathing apparatus
SSO	Site Safety Officer
STLC	Soluble Threshold Limit Concentration
SVE	soil vapor extraction
SVOC	semivolatile organic compound
1,1,1-TCA	1,1,1-trichloroethane
TCE	trichloroethylene
TLV	threshold limit value
TPH	total petroleum hydrocarbon
TWA	time-weighted average
µg/kg	microgram per kilogram
UN	United Nations
USA	Underground Service Alert
UST	underground storage tank
VOC	volatile organic compound

Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 1
October 4, 2006

1.0 OVERVIEW AND SUMMARY

This Health and Safety Plan (HASP) has been prepared by Avocet Environmental, Inc. (Avocet) for the installation of ground water wells at the Boeing Realty Corporation (BRC) Former C-6 Facility in Los Angeles, California. It describes the site-specific chemical and physical hazards that may be encountered during the work and the “generic” hazards associated with working with and around drilling rigs and other heavy equipment. The HASP specifies the procedures and measures to be followed to eliminate or minimize these hazards. Avocet personnel involved in field work at the site are required to read and understand this HASP and must follow it in the field. Subcontractors under Avocet’s control shall follow this HASP or health and safety procedures that are at least as stringent.

The remainder of this overview and summary section is written in plain English and with a minimum of technical jargon to make the information more accessible and understandable. Sections 2.0 through 19.0 provide more detailed, technical information.

1.1 SITE INFORMATION

The C-6 Facility consists of a 159-acre property on the southwest corner of Normandie Avenue and 190th Street in Los Angeles, California (Figure 1). The facility consists of four lettered parcels (Parcels A through D) roughly divided by three access roads; Harbortate Way, Knox Street, and Francisco Street. The site is bounded on the north by 190th Street and to the East by Normandie Avenue. To the west of the site is the former Industrial Light Metals facility, and to the south, the former Montrose facility and a residential area. While in operation, the site featured two large aircraft assembly “hangar”-style buildings, several smaller support buildings, and various employee parking areas. Operation of the C-6 Facility ceased in mid-2000, by which time it had become limited to small-scale manufacturing and warehousing.

1.2 CHEMICALS IN THE SUBSURFACE

Previous environmental work at the C-6 Facility has included a series of Phase II investigations targeted at the various parcels, a facility-wide groundwater assessment and monitoring program, as well as several smaller, more localized investigations. The soil and groundwater investigations were, and still are, conducted with oversight from the Los Angeles Regional Water Quality Control Board (LARWQCB). The principal Phase II investigation was performed for Parcel A in 1996 (*Kennedy Jenks Consultants, Final Phase II Subsurface Investigation, Douglas Aircraft Company C-6 Facility, Parcel A, Torrance, CA*).

In brief, the 1996 Phase II soil investigation showed that operations within the C-6 Facility boundary were the most likely cause of several limited subsurface impacts. The most notable of these impacts were the volatile organic compounds (VOCs) detected beneath the former Building 36, a former paint and solvent storage area. Soil samples collected from borings drilled beneath Building 36 contained significant amounts of chlorinated VOCs. The highest of these



Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 2
October 4, 2006

concentrations were encountered between 20 and 40 feet below ground surface (bgs). The VOCs in question were 1,1-dichloroethane (1,1-DCA) at 6,300 micrograms per kilogram ($\mu\text{g/kg}$); 1,1-dichloroethylene (1,1-DCE) at 5,400 $\mu\text{g/kg}$; 1,1,1-trichloroethane (1,1,1-TCA) at 33,000 $\mu\text{g/kg}$; and trichloroethylene (TCE) at 97,000 $\mu\text{g/kg}$. The same area also indicated concentrations of aromatic VOCs, ranging from 1,200 $\mu\text{g/kg}$ of benzene to almost 3,000,000 $\mu\text{g/kg}$ total xylenes. Sampling results from the remainder of Parcel A also indicate the presence of lead (72 milligrams per kilogram [mg/kg]) and total petroleum hydrocarbons (TPH [1,200 mg/kg]).

The facility-wide groundwater assessment has shown that groundwater beneath the C-6 Facility has been impacted by chlorinated VOCs, most notably TCE. The impacts are attributable to potential onsite releases and to releases from the nearby Industrial Light Metals facility.

1.3 PURPOSE OF HASP

This HASP identifies and describes the chemical and physical hazards that may be encountered during the planned subsurface investigation work at the site and specifies the **minimum** health and safety measures to be taken to avoid or minimize them. The HASP is intended to prepare onsite workers and the Site Safety Officer (SSO) for the anticipated potential hazards. The HASP is also intended to enable workers and the SSO to respond to changing conditions and make professional judgments regarding the interpretation of monitoring data and related control measures. Specifically, this HASP is intended to:

- Inform all field personnel, contractors, subcontractors, and visitors of the potential hazards associated with the work to be performed at the site.
- Identify the minimum precautionary measures and personal protective equipment (PPE) to be used to mitigate those potential hazards.

Avocet personnel involved in the demolition work at the site are required to read and understand this HASP and must follow it in the field. Subcontractors under Avocet's control must follow this HASP or health and safety procedures that are at least as stringent. Prior to any field work during which exposure to hazardous conditions could occur, Avocet and subcontractor personnel under Avocet's control must sign a HASP Review Form as an acknowledgement of their understanding of its contents and as an agreement to follow its procedures and guidance. Visitors to the site during the field work will also be familiarized with this HASP and be required to sign the HASP Review Form. A copy of this HASP will be available onsite at all times while subsurface investigation work is in progress. In addition, all Avocet personnel will be required to carry a "DASH" card containing emergency contact information and a map of the route to the nearest hospital with them at all time while onsite.

Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 3
October 4, 2006

1.4 MINIMUM PPE

The minimum PPE required for workers at the site is modified Level D. Modified Level D PPE includes:

- hard hat
- safety glasses
- high visibility safety vest
- long pants
- steel-toed shoes or boots.

In addition, each worker must have hearing protection devices with them at all times while at the site for use as needed. Each worker must also have a half- or full-face air-purifying respirator (APR) available should ambient air quality monitoring indicate that such protection is required.

Visitors to the site must wear hard hats and safety glasses and have hearing protection available for use as needed. Visitors are not required to have APRs available but will not be allowed into any work area in which ambient air quality monitoring dictates that workers must wear half- or full-face respirators.

1.5 SAFE WORKING PRACTICES

The potential hazards associated with chemicals in air, soil, and water will be minimized by avoidance and PPE as appropriate. In addition to these chemical hazards, however, much of the subsurface investigation will involve working with and around heavy equipment. Heavy equipment is a potential hazard due to excessive noise and the risk of physical injury. Accordingly, workers must have hearing protection available at all time. Further, workers must use caution when working around heavy equipment and should assume the operator cannot see them. Workers should not enter any un-shored excavation deeper than 4 feet unless a qualified person has made a determination that it is safe to do so and all applicable California Department of Occupational Safety and Health (Cal/OSHA) requirements are met. In addition, the Avocet project manager must specifically authorize entry into any excavation over 4 feet deep.

1.6 NEAREST HOSPITAL

In the event of a medical emergency, the nearest hospital equipped with an emergency room is:

Los Angeles County Harbor-UCLA Medical Center
1000 W. Carson Street, Torrance, California 90502
Long Beach, California 90806

The hospital is located approximately 1.94 miles to the south of the site. The driving time from the site is approximately 4 minutes. A map showing a route to the hospital is provided in Section 6.0 and is included on the back of the DASH cards carried by Avocet personnel.



Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 4
October 4, 2006

1.7 HASP ORGANIZATION

Section 2.0 of this HASP provides a summary of site-specific background information. Section 3.0 outlines the objectives of the HASP and how it will be implemented. Section 4.0 discusses action levels and the PPE required for site workers. Emergency telephone numbers and detailed hospital information are provided in Section 5.0 and 6.0, respectively. Sections 7.0 through 19.0 provide non-project-specific health and safety information.

Supporting information is included in the tables, figures, and appendices that follow the text of this HASP. Appendix A includes examples of standard forms used for health and safety-related monitoring and reporting. Appendix B contains material data safety sheets (MSDSs) for each of the chemicals of potential concern at the site.

Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 5
October 4, 2006

2.0 SITE-SPECIFIC BACKGROUND INFORMATION

Background information considered relevant to this HASP includes a description of the site and its location, the site's history, past chemical use and a summary of chemicals known or likely to be present in the subsurface.

2.1 FACILITY LOCATION

The C-6 Facility is located in Los Angeles, California, between the cities of Torrance to the west and Carson to the east. On a more local basis, it is located on the west side of Normandie Avenue and immediately to the south of 190th Street. The C-6 Facility is bordered to the west by the former Industrial Light Metals facility and by the former Montrose facility and residential neighborhoods to the south. The facility and its immediate surroundings can be seen in Figure 1.

2.2 FACILITY DESCRIPTION

The former C-6 Facility occupies approximately 170 acres and is divided into four distinct parcels (Parcels A through D). The principal operation at the facility was the manufacture and assembly of DAC C-6 aircraft produced by Douglas Aircraft Company (DAC) and, subsequently, by The Boeing Company (Boeing). The site was reportedly used for the manufacture of aircraft as early as 1952. Prior to that time, industrial use of the site included aluminum and steel production following initial development of the property from farmland in the early 1940s. While in operation, the site featured two large hangar-style buildings, located in Parcel C and used for final assembly of the airplanes. Parcels A, B, and D contain numerous support buildings and associated employee parking lots. Aircraft manufacturing ceased at the C-6 Facility in 1992, after which time the site was used for smaller-scale manufacturing and various warehousing. Since closure in 2001, the site has undergone varying degrees of demolition and redevelopment to its current condition.

2.3 PREVIOUS ENVIRONMENTAL INVESTIGATIONS

Previous environmental work can be broadly divided into a facility-wide Phase I environmental site assessment (ESA) in 1996, a series of Phase II soil investigations in 1996 and 1997, and ongoing groundwater monitoring.

2.3.1 Phase I ESA in 1996

In 1996, Kennedy/Jenks Consultants (KJC) was retained to conduct a Phase I ESA for Parcels A, B, and C of the C-6 Facility. It is noted, however, that the parcel designation at that time does not match the current facility layout. At the time, aircraft manufacturing operations at the C-6 Facility had effectively ceased but portions of the facility were still active. Based on a review of facility and agency environmental records, employee interviews, and walk-over surveys, KJC identified 43 underground storage tanks (USTs), only 2 of which (located within Parcel B) remained in use at the time of the Phase I ESA. KJC reviewed records indicating that



Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 6
October 4, 2006

groundwater beneath the property had been impacted by VOCs, potentially as a result of leakage from any number of the former USTs. Previous Phase II investigations show that VOCs detected beneath the former C-6 Facility may also have migrated onsite in the mobile shallow zone aquifer.

2.3.2 Phase II Soil Investigation in 1997

KJC completed a Phase II soil characterization for Parcel A of the C-6 Facility in July 1997. At the time of the Phase II investigation work, Parcel A constituted the entire northern portion of the C-6 Facility, once again varying slightly from the parcel layout used at present. In the course of completing their Phase II investigation, KJC identified four areas of potential concern, as described below.

Building 36. Building 36 was formerly a paint and solvent storage area, and previous investigations conducted during the removal of the USTs reported VOCs in the underlying soils. As expected, the Phase II soil characterization detected TCE, 1,1-DCE, 2-butanone (MEK), and other VOCs in samples from borings beneath Building 36. The highest concentrations of chlorinated hydrocarbons were reported as follows: 6,300 µg/kg of 1,1-DCA; 5,400 µg/kg of 1,1-DCE; 1,600 µg/kg of cis-1,2-DCE; 33,000 µg/kg of 1,1,1-TCA; and 97,000 µg/kg of TCE. Aromatic hydrocarbons were also detected at the following concentrations: 1,200 µg/kg of benzene; 370,000 µg/kg of ethyl benzene; 3,700,000 µg/kg of toluene; 2,300,000 µg/kg m,p-xylenes; and 690,000 µg/kg o-xylenes. These aromatic hydrocarbons decreased greatly in the deeper samples; only toluene (5,900 µg/kg) and m,p-xylenes (180 µg/kg) were detected in the 50-foot sample.

These aromatic compounds are very limited in lateral extent. The subsurface distribution of these chemicals of concern (COCs) somewhat reflects a relationship with the underlying soil units. The concentrations are highest and the lateral distribution widest around 20 to 40 feet bgs, possibly related to soil changes from primarily clay to primarily silts and even to sand at the deeper depths. It appears that the COCs tend to spread out near the change in soil units. Although the COCs have high concentrations in the Building 36 area, the lateral extent of concentrations greater than 500 µg/kg is generally limited to the area along the western side of Building 36 and north to the southern end of Building 37.

Building 66-1 Washdown. Several VOCs were detected in shallow soil samples collected from this location. The most significant concentration encountered was 210,000 µg/kg of TCE. It is believed that the impacted soils are most likely related to washdown procedures. No impacted soil was encountered at depths greater than 1 foot bgs.

Borings 1-27 and 1-27A. Both of these borings were located in one of the open areas contained within Parcel A of the C-6 Facility. Lead was encountered in samples from each of these borings at a maximum of 72 mg/kg in the 1-foot sample collected from Boring 1-27. This concentration exceeds 10 times the Soluble Threshold Limit Concentration (STLC) for lead of 5.0 mg/kg. No lead was encountered in any of the deeper samples.

**Health and Safety Plan
Groundwater Well Installation**

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 7
October 4, 2006

Borings SA-NE-14 and SA-NE-17. Both of these borings, located once again in an open area of Parcel A, were found to contain soil impacted by TPH. The TPH was encountered in samples collected at depths ranging from 6 to 10 feet bgs. The maximum TPH concentration was encountered at 6 feet and totaled 1,200 mg/kg, with 13 mg/kg discovered in the gasoline carbon chain range.

Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 8
October 4, 2006

3.0 HASP OBJECTIVES AND IMPLEMENTATION

Avocet's goal is to maintain a safe and healthy work environment during the performance of project work activities. This section outlines the objectives of the HASP and describes how it will be implemented.

3.1 HASP OBJECTIVES

In simple terms, this HASP is intended to prepare workers and the SSO for the anticipated potential hazards and enable them to respond to changing conditions and to make professional judgments regarding the interpretation of monitoring data and related control measures. Specifically, this HASP is intended to:

- Familiarize Avocet and subcontractor field personnel and visitors with conditions at the site and the potential site-specific and generic hazards associated with the work to be performed.
- Prescribe the **minimum** precautionary measures and PPE to be used to minimize the potential for injury or exposure to hazardous conditions.
- Train Avocet employees, contractors, and subcontractors on the proper action to be taken if a hazardous condition cannot be avoided by engineering controls.
- Provide guidelines for emergency response for known hazards and potential hazardous situations.
- Specify the actions required to comply with applicable U.S. Department of Labor, Occupational Safety and Health Administration (OSHA), Cal/OSHA, and state and local regulations or other requirements.

Given that the scope of the work can change as it progresses, this HASP also covers common site assessment and remediation activities that may be beyond the anticipated scope of the subject work at this time. The work activities covered by this HASP are summarized in Table 1.

3.2 HASP IMPLEMENTATION

All Avocet and subcontractor field personnel will be required to follow the guidelines and procedures outlined in this HASP. A copy of this HASP will be made available to Avocet's contractors and subcontractors (collectively referred to as "contractors") prior to any fieldwork during which exposure to hazardous conditions could occur. A copy of this HASP will also be available onsite in a prominent location while work is being conducted. Site personnel are required to sign a HASP Review Form (Appendix A) as an acknowledgement of agreement, acceptance, and understanding of its contents. Visitors to the site will be familiarized with this HASP and

Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 9
October 4, 2006

will be required to sign a HASP Review form to acknowledge that they are aware of the known and potential hazards and the associated precautionary measures.

The Project Manager, Health and Safety Director (HSD), and SSO may impose any other procedures or prohibitions that they believe are necessary for safety. If the client has established health and safety and/or emergency procedures that are more stringent, the client's procedures will, after approval from the HSD, supersede those of similar purpose in this HASP.

Avocet's contractors for the subject project are required to provide suitably trained and experienced workers, equipped with their own PPE. Moreover, contractors under contract to Avocet for the subject project are required to have established health and safety procedures that cover the work activities they are responsible for and that are at least as stringent as this HASP. In the event of a conflict between this HASP and a contractor's health and safety procedures, Avocet's HSD will be notified and asked to resolve the conflict.

Avocet is not responsible for the health and safety of contractors under contract or subcontract directly to the client. However, any unsafe work practices observed will be stopped and brought to the attention of the contractor supervisor, the SSO/HSD, and/or the client representative.

This HASP will be amended, if needed, for future field or remedial activities that were not anticipated at the time this HASP was prepared.

3.3 PRE-PROJECT CHECKLIST

Before commencing any field activities, Avocet's SSO will meet with on-site personnel familiar with the site and operations. During the meeting, the SSO will verify that the information contained in this HASP is current, accurate, and applicable to the site. The SSO must obtain, check off, and document the following information:

- _____ 1. Verify that all emergency phone numbers are correct and applicable to site.
- _____ 2. Verify that the location of the nearest hospital is correct and that the hospital can handle possible emergencies from the project.
- _____ 3. Verify that on-site personnel show you any lock-out devices for valves and electrical.
- _____ 4. Obtain information about availability and location of telephone, rest rooms, drinking water, and emergency eyewash and shower station(s) closest to work area. Identify evacuation routes and predominant wind direction.
- _____ 5. Review site background information and any available historical sampling results.
- _____ 6. Review the list of chemicals of concern for the site and their respective concentrations and relevant toxicity information (Table 2).

Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 10
October 4, 2006

- _____ 7. Information obtained shall be documented in this site-specific HASP and associated amendments and communicated in the daily tailgate meeting to all project personnel, subcontractors, and visitors.
- _____ 8. Verify that all subcontractors have a copy of this HASP and copies of training records, medical monitoring cards, and respirator fit test records, if required.

3.4 TAILGATE MEETINGS

A health and safety "tailgate" meeting will be held prior to starting work each day to discuss safety procedures, familiarize personnel with potential hazards, and answer any questions. The meeting will be conducted by the SSO and all site personnel involved with the project work activities will be required to attend. A daily sign-in sheet will be used to document attendance of this meeting. An example of a form for documenting attendance is included in Appendix A

All incidents, including any near misses, shall be reported to the HSD and Project Manager. Reporting forms are included in Appendix A.

Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 11
October 4, 2006

4.0 ACTION LEVELS AND PPE REQUIREMENTS

Based on historical operations at the site and the results of previous soil and ground water investigations, there are several chemicals of concern potentially present in the subsurface at the site. Each of these chemicals is listed in Table 2, along with salient health and safety information. Project action levels and PPE requirements are discussed below. As site activities are completed and any sampling results are obtained, the HASP may be amended to include any additional data that would require a change in the health and safety procedures outlined in this HASP.

4.1 EXPOSURE LEVELS

OSHA and Cal/OSHA regulate exposure to the chemicals of concern listed above. Where available, Cal/OSHA permissible exposure limits (PELs) and ceilings are used; otherwise, OSHA values are used. In addition, the National Institute for Occupational Safety and Health (NIOSH) and the American Conference of Governmental Industrial Hygienists (ACGIH) publish recommended exposure levels (RELs), threshold limit values (TLVs), and Immediately Dangerous to Life and Health (IDLH) values, respectively, and ceiling exposure limits.

The chemical, physical, and toxicological characteristics of the project-specific chemicals of concern are summarized in Table 2. Copies of the MSDSs or NIOSH chemical hazard sheets for each chemical of concern are included in Appendix B.

4.2 RESPIRATORY PROTECTION ACTION LEVELS

Based on the exposure action levels for the chemicals of concern, 1,1-DCE has been identified as the "target compound" for air quality monitoring purposes. The target compound should have the lowest PEL or REL of the organic compounds likely to be encountered during the field activities. 1,1-DCE is considered by NIOSH to be a known carcinogen and the Cal/OSHA PEL time-weighted average (TWA) for 1,1-DCE in air is 1.0 ppm (Table 3). In practical terms, this is the lowest feasible concentration (LFC) that can be reliably monitored using field equipment and 1.0 ppm (above background) will serve as the trigger for respiratory protection. The IDLH concentration for 1,1-DCE is >500 ppm.

To avoid potential exposure to a carcinogenic vapor, a photoionization detector (PID) reading of 1.0 ppm over background, in the breathing zone, for a 2 minute duration will require that half-face APRs be worn. As half-face respirators provide a protection factor of 10, employees wearing them should, theoretically, be able to work in concentrations up to 10 ppm over background. For conservatism, however, Avocet has set 10 ppm as the "stop work" trigger level. If a reading greater than 10 ppm over background is maintained for a 2 minute period the area will be cleared until the concentration drops, engineering controls are implemented or properly trained individuals capable of wearing self-contained breathing apparatus (SCBA) are available.

Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 12
October 4, 2006

Action Levels and Procedures

Time or Action Level	Action
Initial site arrival	Perimeter survey with PID or organic vapor meter (OVM)
LEVEL D During site activities	Vapor monitoring at 20-minute intervals or when odors noted in ambient air. <i>Use water to control dust. If dust cannot be controlled, stop work.</i>
LEVEL C – Half-Face PID > 1 ppm over background for 2 minutes Visible Dust	Stop work: Don respirators (half-face) and evaluate the need for Level C dermal protection <i>Use water to control dust. If dust cannot be controlled, stop work.</i>
PID > 10 ppm over background for 2 minutes	Stop work and contact HSD: Reevaluate the need for engineering controls to reduce vapor concentrations. Work will not proceed until vapor concentrations are reduced, engineering controls are in place or properly trained personnel with supplied air respiratory protection equipment are available.

4.3 PERSONAL PROTECTIVE EQUIPMENT

The following levels of PPE may be required for this project:

- Level D: Required for this project.
- Level C: If required, NORTH Multi-purpose Cartridge/Filter **No. 7583P100, 75SCP100** or approved equivalent.
- Levels B and A: Not expected for this project. If conditions require the upgrade to Level B, the HSD will be notified for approval of the upgrade. The HASP would then be amended.

APRs provide no protection in an oxygen-deficient atmosphere

4.4 AIR QUALITY MONITORING

Air quality monitoring will be conducted to determine the presence and concentration of chemicals to assess the hazard to personnel and to determine the level of PPE required. The results of the air monitoring will be recorded and used to upgrade or downgrade the level of

Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 13
October 4, 2006

personal protection required. An example of a form for recording the air monitoring results is included in Appendix A.

Organic vapor levels in ambient and breathing zone air will be monitored by the SSO using an OVM or PID. Visual observations will be noted regarding the level of dust being generated during fieldwork. The duration and frequency of air quality monitoring will be determined by the SSO, if conditions warrant air monitoring activities. Monitors that are approved for use on the project are:

- Photovac Model 2020
- Photovac Micro Tip MP-1000
- MiniRae 2000 PGM-7600
- Thermo Environmental Instruments Determinator
- Foxboro Model OVA 108
- GasTech GT 400 series (four gas – including H₂S)

Each monitor will be field-calibrated daily following the appropriate field calibration information and procedures presented in the manual. Manuals are kept inside the case of each instrument.

4.5 PERSONAL AIR QUALITY MONITORING

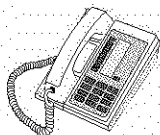
The necessity for personal air quality monitoring equipment will be evaluated by the SSO based on air quality monitoring in the breathing zone, using an OVM or PID, and professional judgment. The persistent presence of concentrations of organic vapors may indicate the need for personal air quality monitoring to evaluate individual exposure and to speciate the VOCs being detected. Should personal air quality monitoring be performed, published OSHA and/or NIOSH sampling and analytical methods shall be used.

**Health and Safety Plan
Groundwater Well Installation**

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 14
October 4, 2006

5.0 EMERGENCY TELEPHONE NUMBERS



Avocet's On-site Representative and Subcontractors have cell phones

**In an EMERGENCY, summon Outside Emergency Services at
911**

Hospital (*see map on following page*)

Los Angeles County Harbor-UCLA Medical Center..... (310) 222-2345 or 911
1000 W. Carson Street, Torrance, California 90502

Fire Department

City of Torrance Fire Dept (Station 3) (310) 781 7040 or 911
3535 W 182nd Street, Torrance, CA 90504

Police Department

Torrance Police Department..... (310) 320-2611 or 911
3300 Civic Center Drive, Torrance, CA 90503

Poison Control Center (California) (800) 764-7661

Chemical Transportation Emergency Center (CHEMTREC)

(Emergency use only)..... (800) 424-9300
(Non-Emergency) (202) 887-1255

Avocet Contacts

- Michael Rendina (Project Manager) Office (949) 296-0977 Ext. 103
..... Cell Phone (949) 933-6031
- Robert Van Hying (Avocet HSD) Office (949) 296-0977 Ext. 101
..... Cell Phone (949) 933-4905
- Michael Lewis (Project Geologist)..... Cell Phone (949) 290-0892

BRC Contact

- Robert P. Scott..... Office (562) 733-2229 or Cell (818) 620-2527

**Health and Safety Plan
Groundwater Well Installation**

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 15
October 4, 2006

STANDARD PROCEDURES FOR REPORTING EMERGENCIES

When calling for emergency assistance, provide the following information:

- Your name _____
- Telephone number at your location _____
- Nature of the emergency _____
- Names of all exposed or injured persons _____
- Actions already taken _____

IMPORTANT: The recipient of the call should hang up first — not the caller

**Health and Safety Plan
Groundwater Well Installation**

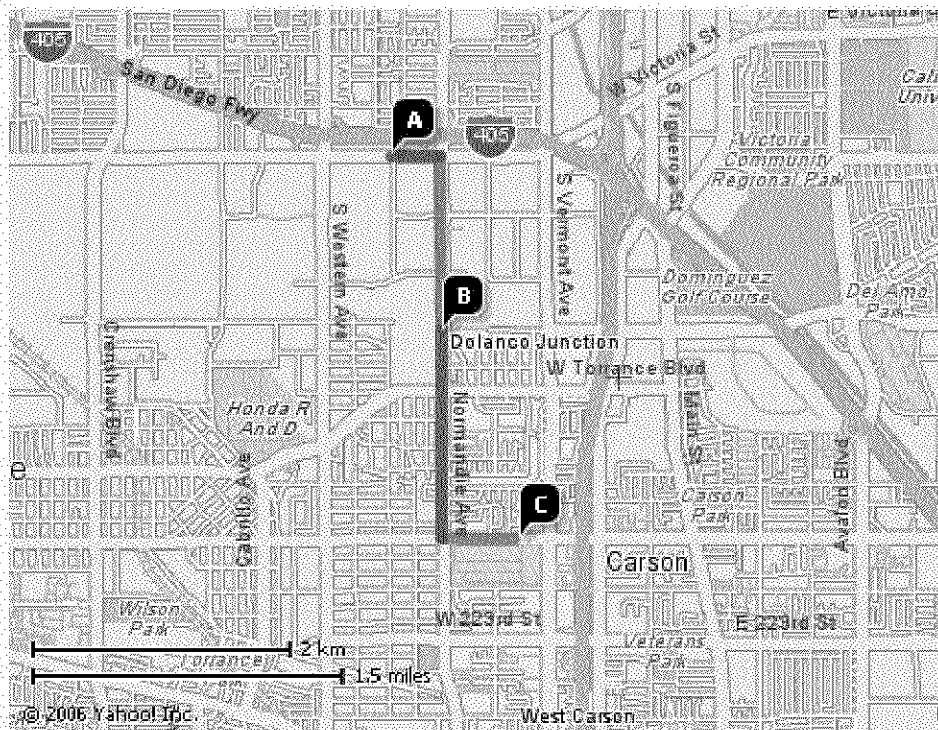
Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 16
October 4, 2006

6.0 HOSPITAL INFORMATION

Los Angeles County Harbor-UCLA Medical Center
1000 W. Carson Street, Torrance, California 90502
(310) 222-2345

Distance: **2.2 miles** Approximate Travel Time: **5 minutes**



Route to Hospital (Start to End)

Notice: No access to Normandie Ave from Knox or Francisco Streets due to construction.

Driving Directions

Head WEST on KNOX STREET toward HARBORGATE WAY	<0.1 Mile
Turn RIGHT on HARBORGATE WAY toward W. 190 th STREET.	0.2 Mile
Turn RIGHT on W. 190 th STREET toward NORMANDIE AVENUE	0.2 Mile
Turn RIGHT (SOUTH) on NORMANDIE AVENUE toward W. CARSON ST.	1.5 Miles
Turn LEFT (EAST) on W. CARSON ST.	0.3 Mile

End at 1000 W. CARSON STREET, TORRANCE, CA 90502



Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 17
October 4, 2006

7.0 GENERAL HASP OBJECTIVES

Avocet's goal is to maintain a safe and healthy work environment during the performance of covered project activities at any site. The generic health and safety procedures outlined in the following sections have been developed to fulfill this goal and achieve the following objectives:

- Instruct Avocet employees and contractors on procedures to minimize the potential for injury or exposure to hazardous conditions.
- Train Avocet employees and contractors on the proper action to be taken if a hazardous condition cannot be avoided by engineering controls.
- Provide guidelines for emergency response for known hazards and hazardous situations.
- Specify actions required to comply with applicable U.S. Department of Labor, federal OSHA, Cal/OSHA, and state and local regulations or other requirements.

This HASP is intended as a guideline that allows the SSO to respond to changing conditions and make professional judgments regarding the interpretation of monitoring data and related control measures. This HASP also delineates health and safety responsibilities and assigns those responsibilities to project and office personnel.

7.1 WORK ACTIVITIES

The following work activities are covered under this HASP:

- Ambient air monitoring
- Field screening, including head-space screening
- Drilling using hand or mechanized equipment
- Soil sampling
- Soil gas sampling
- Ground water well installation, development, and abandonment
- Ground water monitoring
- Free product or light, non-aqueous phase liquid (LNAPL) recovery
- Concrete coring/sawing/removal
- Surveying
- Sample equipment decontamination
- Decontamination of drilling and other equipment
- Personnel decontamination
- Remedial excavation, trenching, backfilling, and resurfacing
- Construction and remediation equipment installation
- Equipment monitoring and maintenance
- Vapor and separator water sampling



Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 18
October 4, 2006

- Aboveground storage tank (AST) sampling
- UST sampling
- UST cleaning and removal
- Supervision of contractors under Avocet's direct control

7.2 IMPLEMENTATION AND MODIFICATION OF THE HASP

A health and safety "tailgate" meeting will be held prior to starting work each day to discuss safety procedures, familiarize personnel with potential hazards, and answer any questions. The meeting will be conducted by the SSO and all site personnel involved with the project work activities will be required to attend. A daily sign-in sheet will be used to document attendance of this meeting.

Proposed changes to this HASP will be discussed with Avocet's HSD and Project Manager and approved by the HSD prior to implementation. Should site-specific conditions change significantly (e.g., additional chemicals or impacted areas are discovered) or additional work activities are required that are not covered in this HASP, an addendum will be prepared and approved by the HSD. After HSD approval, no additional work activity will be performed until appropriately trained, qualified, and outfitted personnel are available. Site personnel will be informed of changes to the HASP at the daily tailgate meetings and will be required to sign the HASP addendum to indicate that they have read and understand it.

Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 19
October 4, 2006

8.0 PROJECT ORGANIZATION AND COORDINATION

The following section identifies the roles and responsibilities of Avocet personnel and contractors conducting field activities at the site.

8.1 HEALTH AND SAFETY DIRECTOR

The HSD will review and approve this HASP and any amendments prior to their adoption. The HSD will assist with implementation of the HASP and provide project support on health and safety issues. The HSD will consult with the Project Manager if revision of this HASP is required. The HSD will verify field personnel training, medical surveillance, and respirator fit test requirements. The HSD will advise the Project Manager regarding industrial hygiene concerns, interpretation and evaluation of analytical exposure data, and other safety related issues, as needed. Contractor health and safety plans will be reviewed by the HSD.

8.2 PROJECT MANAGER

The Project Manager is responsible for ensuring that the HASP is prepared, reviewed, approved, and properly implemented. The Project Manager will not initiate field activities until the HASP has been approved by the HSD and assigned personnel have received the required level of project-specific health and safety instruction. The Project Manager will review and evaluate field and laboratory data as they become available during the course of the project and consult with the HSD and SSO if revisions to the HASP are required. The Project Manager is responsible for the overall health and safety performance and compliance with applicable regulations and is the primary contact in the event of a site emergency. In addition, the Project Manager will ensure that health and safety activities are conducted according to HASP requirements and according to other, relevant company policies and procedures. On-site injuries, illnesses, and accidents will be reported to the client by the Project Manager/HSD.

8.3 SITE SAFETY OFFICER

The SSO will implement this HASP in the field. The SSO's authority and responsibilities include, but are not limited to, the following:

- Conduct the daily tailgate meeting with site personnel before work begins each day regarding the contents of the HASP and any approved HASP revisions, the potential hazards that may be encountered (with emphasis on those that may be encountered that particular day), safe work practices, required PPE, and emergency procedures.
- Maintain a copy of the HASP and any approved revisions at the site in an easily accessible area.

Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 20
October 4, 2006

- Ensure that PPE required or potentially required by the HASP is available and, when appropriate, worn by personnel working at the site.
- Control access to the exclusion zone and/or work areas as defined.
- Establish emergency evacuation routes and designated meeting places in advance of each work activity and communicate this information during the daily tailgate meeting.
- Coordinate the response to emergencies at the site, direct evacuation, or summon emergency assistance as necessary.
- Conduct site walk-through inspections on a regular basis.
- Maintain field documentation, including daily tailgate attendance sheets, visitor sign-in sheets, air monitoring data, and site walk-through inspection results.
- Notify the HSD and Project Manager immediately regarding all health and safety problems, emergencies, injuries, illnesses, near-misses, and accidents.
- Assign an alternate SSO if the designated SSO will be absent.
- Suspend work activities when unsafe conditions or work practices are observed at the site.
- Remove contractor personnel from the project if the contractor is operating in an unsafe manner.
- Notify the HSD and Project Manager of changes in site conditions or in the scope of field activities.

8.4 WORK PARTY

Members of the work party, defined as personnel and contractors working on the project that report to Avocet, are required to comply with the health and safety requirements specified in this HASP and, if appropriate, in their corresponding company health and safety manuals. The responsibilities of the work party members include, but are not limited to, the following:

- Read this HASP and observe the Code of Safe Work Practices (Section 9.0).
- Participate in daily tailgate meetings and any project-specific training.
- Implement safe work practices and good personal hygiene for hazardous waste operations.



Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 21
October 4, 2006

- When unsafe conditions or work practices are observed at the site, **Stop** what is being completed, **Warn** others nearby, **Inform** the SSO, and **Manage** the situation (SWIM).
- Maintain PPE in good working condition.
- Respond to site emergencies, if necessary, and direct evacuation or summon emergency assistance.

8.5 CONTRACTORS

Most contractors have their own health and safety plans and/or company policies that are specific to their specialty services. Contractor management is responsible for making sure their employees follow their company-specific health and safety plans and/or company policies. Contractor management is also responsible for assigning specific tasks to their employees; ensuring that their employees are properly trained and are in compliance with applicable regulations; and allocating sufficient time, materials, and equipment to safely complete activities in accordance with this HASP and their individual health and safety plans.

While engaged in work activities under contract to Avocet, contractors shall operate under their own health and safety plan, provided the health and safety requirements in any health and safety plan prepared by a contractor are as stringent as those contained in this HASP. The HSD will ensure that the health and safety procedures of its contractors are at least as stringent as those presented in this HASP. In the event of a conflict between this HASP and the contractor's health and safety plan, the HSD will be notified and required to resolve the differences.

Hazards not listed in this HASP but known by the contractor, or known to be associated with a contractor's specialty, must be identified by and addressed in the contractor's health and safety plan and during the daily tailgate meeting prior to beginning work.

Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 22
October 4, 2006

9.0 CODE OF SAFE WORK PRACTICES

Avocet personnel and contractors assigned to this project will comply with the following at all times:

- Each day prior to the performance of any field activity, the SSO will review this site-specific HASP with all involved personnel during the tailgate meeting. The meeting will focus on the specific task(s) to be performed, contaminants likely to be encountered, and the current physical condition of the site and work areas. The SSO will also answer questions raised by the attendees. Personnel will indicate an understanding of the HASP requirements and agree to accept and comply with the conditions contained herein by signing and dating the daily tailgate sign-in sheet.
- Workers who refuse to sign the HASP or attend a tailgate meeting will not be allowed to enter any work areas under Avocet's control.
- Visitors entering work areas under Avocet's control, but who will not be performing work, will be familiarized with this HASP and required to sign the visitor's sign-in sheet. Visitors will typically be required to wear hard hats and safety glasses at all time while onsite.
- Unauthorized personnel will remain outside the exclusion and contamination reduction zones at all times.
- Avocet-supervised personnel must be aware of project-related traffic. Additionally, project personnel will be advised that non-Avocet-supervised personnel and traffic may be present onsite. These individuals and associated traffic will be excluded from Avocet-supervised work areas.
- All open holes, trenches, and obstacles will be properly marked, barricaded, covered, and lighted in accordance with applicable regulations.
- Aboveground structures and other obstacles may be present onsite. A complete daily review of such site conditions will be conducted prior to beginning any activity.
- To avoid vehicle collisions with aboveground structures, drivers must walk around their vehicles and observe the locations of all obstacles prior to moving any vehicle.
- The movement and use of vehicles and heavy equipment will be planned and performed with consideration for the location, height, and position of fixtures, structures, and natural features.



Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 23
October 4, 2006

- Unsafe conditions or safety concerns will be brought to the attention of the SSO. If the unsafe condition involves personnel or contractors other than those under Avocet's control, the SSO will notify the HSD, who will contact the client, if needed.
- At a minimum, Level D PPE is required when performing any field activities related to the project. Level D PPE includes a hard hat, safety glasses, long sleeve shirt, long pants, and steel-toes shoes or boots.
- Work that requires workers to be greater than 6 feet from the ground surface will require fall protection. The HSD will approve the fall protection devices on a case-by-case basis; however, Avocet will not be responsible for providing fall protection for contractor activities.
- No Avocet-supervised personnel will enter an un-shored excavation deeper than 4 feet below surrounding grade at any time unless a qualified person has made a determination that it is safe to do so and all applicable OSHA and Cal/OSHA requirements are met. In addition, the Avocet project manager must specifically authorize entry into any excavation over 4 feet deep. Further, no Avocet employee shall approach within 2 feet of the edge of any excavation greater than 4 feet in depth.
- No personnel may enter any confined space unless they are appropriately trained, the necessary safety precautions are taken, and they are specifically authorized to do so by the HSD.
- The SSO and workers will keep track of weather conditions and wind direction to the extent they could affect potential exposure. Work will normally be limited to daylight hours and benign weather conditions. Extremes in temperature and weather conditions may restrict working hours.
- Personnel will be alert to any abnormal behavior on the part of other co-workers that might indicate distress, disorientation, or other ill effects.
- Personnel should never ignore symptoms that could indicate potential exposure to chemical contaminants. Any symptoms or ill effects will be immediately reported to the SSO.
- Personnel with long hair will secure it in a safe manner.
- Loose-fitting clothing that could become entangled in power equipment will not be permitted in the work zones.
- Working while under the influence of intoxicants, narcotics, or controlled substances is prohibited. Persons visually deemed under the influence of alcohol



Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 24
October 4, 2006

or drugs will be escorted off site immediately and will be prohibited from ever working at the site again.

- All ancillary activities will be located upwind, as determined by a flag or other wind direction-indicating device mounted no less than 4 feet above the ground surface.
- Workers must wash their hands and faces before leaving the work areas or site, before eating or drinking, and at the end of the workday.
- No smoking is allowed in designated work areas.
- No eating or drinking is allowed within designated exclusion zones.
- Horseplay is prohibited on the site.

Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 25
October 4, 2006

10.0 TASK HAZARDS AND REQUIRED CONTROL MEASURES

The following sections present control measures for typical hazards likely to be encountered during field work.

10.1 ACOUSTIC HAZARDS

The use of heavy equipment may generate noise at or above the Cal/OSHA (Title 8, Section 5095) time-weighted average (TWA) of 85 dBA (decibels, A-scale) within the worker's hearing zone. Hearing protection, such as earplugs or earmuffs, will always be available onsite for use by personnel at their discretion or on instruction from the SSO. Hearing protection will be used whenever noise levels interfere with conversation in a normal voice at a distance of 3 feet.

10.2 BIOLOGICAL HAZARDS

Potential biological hazards commonly encountered during site assessment and remediation activities include rodents, snakes, insects, and plants. To minimize these potential hazards, the SSO and workers will:

- Review the identification and habitat characteristics of rodents, snakes, spiders (black-widow and brown recluse), and bees/hornets to avoid bites or stings.
- Identify site personnel with a known reaction to any such bites and/or insect stings.
- Avoid nesting areas and habitats, when possible, and wear protective clothing, hardhat, and safety glasses. Always wear protective gloves when reaching into enclosed spaces, such as well boxes, where animals and/or insects are likely to hide.
- Keep all piping off the ground unless the ends are sealed against animals and insects.
- Review the identification characteristics of poison oak and poison ivy. Avoid contact with these plants and any unknown plants when possible. Wear protective clothing.
- Avoid animal and bird droppings. These often contain mold, fungus, or bacteria that can cause respiratory problems such as lung diseases and allergies. When entering nesting areas, wear protective clothing and use a dust mask or a respirator equipped with dust cartridges.

Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 26
October 4, 2006

10.3 CONFINED SPACE/OXYGEN DEFICIENCY HAZARDS

As a general rule, Avocet's employees and contractors will avoid confined space entry and potentially oxygen deficient atmospheres unless the anticipated scope of work specifically includes such activities and the necessary precautionary measures have been taken. Precautionary measures include, but are not limited to, specialized training, the availability of confined space entry equipment and monitoring instruments, comprehensive lock-out procedures, an evaluation of possible chemical hazards in the confined space, and permitting. HASPs for projects involving confined space entry will include a project-specific confined space entry program, which will consist of information on the confined space(s) and the required safety measures to be implemented. In general, however:

- Entry into confined spaces will be under Avocet's confined space entry program.
- All involved workers will review the confined space program prior to entry into a confined space.
- Prior to entry, workers shall monitor the air inside of the confined space for O₂, lower explosive limit (LEL), and H₂S.
- Entry into a confined space is prohibited if the oxygen content of the atmosphere is less than 19.5 percent.

Confined space entry is not permitted under this HASP. A HASP amendment will be required for confined space work.

10.4 ELECTRICAL HAZARDS

To minimize potential electrical hazards, workers are required to:

- Locate and mark buried electric lines before performing any subsurface work.
- Maintain at least a 10-foot clearance from overhead power lines. Contact utility company for minimum clearance requirement from high voltage power lines.
- If unavoidably close to buried or overhead power lines, have the power turned off with the circuit breaker locked and tagged.
- Properly ground all electrical equipment and use Ground Fault Circuit Interrupters (GFCI).
- If splicing wires to connect electrical equipment, use proper insulated connectors and wrap with electrical tape.
- If power has been turned off, someone will show the SSO where the power has been turned off so that the SSO can periodically verify that it has not been turned back on.

Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 27
October 4, 2006

- Do not perform work on electrical hook-ups and/or equipment when they are located in standing water. When water is present, either drain/dry the area or move the equipment to a dry location.

When necessary, workers are required to use proper lockout and tag-out procedures during equipment maintenance. These procedures include:

- Notify all affected employees that a lockout is required and its purpose.
- If the equipment is operating, shut it down in accordance with established procedures.
- Operate the switch, valve, or other isolating device so that the energy source(s), such as electrical, mechanical, hydraulic, and steam, is disconnected or isolated from the equipment. Stored energy, such as in capacitors, springs, elevated machine members, rotating flywheels, pressurized hydraulic systems, and other pressurized systems must be dissipated by methods such as grounding, repositioning, blocking, or bleeding as appropriate.
- Lock out energy isolating devices with an assigned individual lock.
- Make sure no personnel are exposed and then operate the equipment activation device to make sure the equipment will not operate. Return the activation device to the OFF or neutral position immediately after this test.
- Attach non-reusable "Accident Prevention" tags that are capable of resisting at least 50 pounds of pull. The tags must state the reason for the lockout, the name(s) of the employee(s) working on the equipment and how they may be reached, the date and time the tag was put in place.

10.5 MECHANICAL HAZARDS

To minimize potential mechanical hazards, the following requirements shall apply:

- Only qualified operators will be allowed to use mechanical equipment.
- Designate routes at the site for mobilization and use of heavy equipment and trucks.
- Do not stand near or out of sight of an operator using concrete-breaking, earthmoving, or other heavy equipment—keep at a safe distance.
- A spotter may be required to work with equipment operators and truck drivers during certain operations.

Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 28
October 4, 2006

- If it becomes necessary to speak with an equipment operator, make eye contact with both the operator and the spotter then signal your intentions before approaching the equipment.
- Mechanical equipment must be inspected daily before operation to verify safe working order.

10.6 MEDICAL HAZARDS

Medical hazards may arise due to exposure to chemicals or due to ambient temperature conditions.

10.6.1 Chemical Exposures

Chemical vapors may be irritating to the eyes, nose, and throat. If a person becomes dizzy, experiences eye irritation or nausea, the person must be removed from the area. To minimize the potential for chemical exposures, the following requirements shall apply:

- Review with all site personnel the information on the MSDS and/or the NIOSH Guide to Chemical Hazards for the chemicals known or suspected to have been used onsite. Site-specific MSDS/NIOSH information is presented in Appendix B.
- All site workers will be advised of the symptoms of exposure to the chemicals at the site. Some of the most common symptoms to be aware of are:
 - Dizziness
 - Nausea
 - Headache
 - Euphoria
 - Eye irritation
 - Nose or throat irritation
 - Chest pains and coughing
 - Skin irritation, rashes and burns
- Conduct direct-reading air monitoring to evaluate respiratory and explosion hazards and list instrument, action level, monitoring location, and action to be taken, in accordance with Section 4.0, if chemical exposure is possible.
- Consult the HSD for personal air monitoring requirements.
- Use appropriate PPE.

10.6.2 Temperature Hazards

The potential for heat- and cold-related temperature hazards is present at all sites.

Heat Stress

With the possible combination of high air temperature, high radiant heat, high humidity, little or no air movement, lack of shade, varying degrees of physical exertion, and the use of semi-

Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 29
October 4, 2006

permeable and impermeable protective clothing, heat stress is always of concern. The SSO and workers will be aware of and look for signs of the following levels of heat stress (listed in increasing severity):

- Heat Cramp - Symptoms and signs include severe muscle cramps (usually in the legs or abdomen), exhaustion, sometimes dizziness or periods of faintness.
- Heat Exhaustion - Symptoms and signs include deep breaths then shallow breathing, rapid strong pulse, then rapid weak pulse, dry hot skin, dilated pupils; loss of consciousness (possible coma); seizures or muscular twitching.
- Heat Stroke - Symptoms and signs include rapid shallow breathing, weak pulse, cold and clammy skin, heavy perspiration, overall body weakness, dizziness that may lead to unconsciousness and possible coma.

In the event a worker is affected by any heat-related condition, the following procedures shall be followed:

- Move person to nearby cool place.
- Allow person to rest.
- Provide water for the person and let them drink under their own power. Do not administer water to an unconscious person.
- If the person appears to be in serious condition, call **911** and summon outside emergency services.
- If a person becomes unconscious, cool them by removing clothing and wrapping them in wet towels or sheets. Pour water over the wrappings. Ensure emergency medical attention is on its way. Do not administer water to an unconscious person.

The necessity for personal heat stress monitoring will be evaluated by the SSO based on the activity to be performed and existing weather and site conditions. The SSO will utilize employee observations and professional judgment to determine the need for such monitoring.

Cold Stress

Depending on the location of the site, cold-related problems may occur, including hypothermia and frost bite. The SSO and workers will be aware of and look for signs of the following:

- Hypothermia - Symptoms and signs include uncontrolled shivering; cool, bluish skin; fatigue or drowsiness; slurred speech; clumsy movements; and irritable, irrational, or confused behavior.
- Frost Bite - Symptoms and signs include pale, waxy-white skin color and skin that is hard and numb, especially fingers, hands, toes, feet, ear lobes, and nose.

Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 30
October 4, 2006

In the event a worker is affected by any cold-related condition, the following procedures shall be followed:

Hypothermia

- Move person to a warm, dry area.
- Remove any wet clothing and replace with dry clothing or wrap the person in blankets.
- If the person appears to be in serious condition, call **911** and summon outside help.
- Have the person drink warm, sweet drinks (e.g., sports-type drinks) if they are alert. Avoid drinks with caffeine.
- Have the person move their arms and legs to create muscle heat. **Do not** rub the person's body or place them in warm water; this may stop their heart.

Frost Bite

- Move person to a warm, dry area.
- Remove any wet or tight clothing that may cut off blood flow to the affected area.
- **Do not** rub the affected area because rubbing causes damage to the skin and tissue.
- **Gently** place the affected area in warm (105°F) water and monitor the temperature to **slowly** warm the tissue.
- When normal feeling, movement, and skin color have returned, the affected area should be dried and wrapped to keep it warm.
- If the person appears to be in serious condition, call **911** and summon outside help.

10.7 PHYSICAL HAZARDS

Physical hazards associated with site activities include, but are not limited to, the following:

- Underground and overhead utility lines. Note that Underground Service Alert (USA) of Southern California or "DigAlert" and site representatives will be notified of all work locations and activities prior to work commencement.
- All borings will be cleared for utilities to a minimum depth of 5 feet using a hand auger or air knife and, if possible, maintain a horizontal distance of 3 feet from any known underground utility. If the proposed boring is located in an area of numerous underground utilities, the boring location shall be moved or cleared for utilities to a minimum depth of 8 feet.
- Electrical hazards associated with equipment and the local power supply.



Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 31
October 4, 2006

- Heavy equipment associated with concrete coring/sawing/removal, hollow-stem auger drilling and soil sampling, and excavation activities.
- Fire (one ABC-rated fire extinguisher must be available at all times).
- Equipment falling from overhead.
- Debris.
- Dust.
- Open excavations.
- Cave-ins.
- Project location.
- Local area traffic.
- Noise (hearing protection will be available).

10.8 EXPLOSIVE HAZARDS

For sites at which explosives were manufactured, stored, or handled, the following procedures apply:

- Review the identification of explosive materials/devices that were manufactured and stored at the site and search the work area thoroughly for any such materials/devices prior to starting and repeatedly during work.
- Do not touch or move identified or suspected explosive materials/devices.
- If suspected explosives are encountered, evacuate the immediate area and keep at a safe distance.
- Contact the SSO immediately after the area has been evacuated for additional instructions.
- Contact client, who will be responsible for further actions such as energetic decon/treatment.

10.9 OTHER HAZARDS

Other hazards may be identified at a job-specific location. Each area will be evaluated for site-specific hazards prior to the daily safety meeting. If a site-specific hazard is identified, it shall be addressed during the daily safety meetings.

Be aware of the general public and their natural curiosity. Ensure that no unauthorized persons are allowed onsite at any time.

**Health and Safety Plan
Groundwater Well Installation**

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 32
October 4, 2006

Field personnel and contractors shall be briefed on all identifiable site-specific hazards in the daily safety meetings.

Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 33
October 4, 2006

11.0 AIR QUALITY MONITORING

If dictated by the work activity, air monitoring will be conducted to estimate the concentration of chemicals (if any) in air, the hazard they may pose to personnel, and the level of PPE required. In particular, air monitoring results will be used to upgrade or downgrade the level of PPE required. PPE and respiratory protection is discussed in this section, while the required levels of PPE for the subject project are addressed in Section 4.0. In general, however, direct-measuring air monitoring equipment, such as OVMs or PIDs, will be used to monitor air in the breathing zone and air-purifying respirators, equipped with the appropriate cartridges, and personal protective clothing will be worn as necessary for worker protection. If necessary, air monitoring stations will be established.

As directed by the HSD, organic vapor levels in ambient air and in the breathing zone will be monitored by the SSO using an OVM or PID. If appropriate, a "four-gas analyzer" will be used to monitor for potentially explosive vapors based on LEL, oxygen, methane, and carbon monoxide measurements. The calibration, maintenance, and use of all air monitoring equipment will be in accordance with the manufacturer's recommendations.

11.1 PERSONAL AIR QUALITY MONITORING

The necessity for personal air quality monitoring equipment will be evaluated by the SSO based on site conditions, air quality monitoring in the breathing zone (using the OVM or PID), and professional judgment. The consistent presence of elevated organic vapor concentrations or dust may indicate the need for personal air quality monitoring to evaluate individual exposure. Should personal air quality monitoring be performed, published OSHA and/or NIOSH sampling and analytical methods will be used.

If personal air quality monitoring is warranted, the frequency and duration will be determined by the SSO and HSD. If the action levels are reached or exceeded for an extended period, the appropriate PPE will be used. The appropriate PPE and project-specific action levels are described in Section 4.0.

11.2 COMBUSTIBLE GASES AND EXPLOSIVE AND OXYGEN DEFICIENT/ENRICHED ATMOSPHERES

When deemed appropriate by the SSO, a combustible gas meter will be used to monitor the work environment for combustible gases, potentially explosive atmospheres, and oxygen deficient or enriched atmospheres. The field team will discontinue activities during those periods of time when meter readings in ambient air are:

- Equal to or greater than 10 percent of the LEL
- The oxygen concentration is less than or equal to 19.5 percent
- The oxygen content is greater than or equal to 23.5 percent

Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 34
October 4, 2006

12.0 PERSONAL PROTECTIVE EQUIPMENT

The PPE described in this section for the indicated protection levels meets American National Standard Institute (ANSI) standards or equivalent. The level of PPE to be worn by field personnel is determined by the SSO, with approval from the HSD. Only personnel who have been certified by a physician as physically capable of respirator usage will be allowed to work at Levels A, B, and C.

Expected PPE levels for this project are identified in Section 4.0. Protection may be upgraded or downgraded, as appropriate, only after the SSO has consulted with the HSD. If respiratory irritation or breathing discomfort is experienced at any time, respirators will be donned immediately. If irritation or discomfort continues, personnel will leave the work area and the HSD will be notified.

Avocet is not responsible for providing any respiratory or dermal PPE equipment, as described herein, to contractor employees. Contractor employees working on the subject project must arrive onsite with their individual assigned PPE, as required for the project, including respiratory protective equipment and spare organic vapor or combination organic vapor/acid gas cartridges. Additionally, contractors will have Level C PPE, as described below, available to their employees at all times.

The SSO will be responsible for ensuring that all personnel comply with the PPE requirements outlined in this section.

12.1 RESPIRATORY PROTECTION UPGRADE GUIDELINES

In the event air quality monitoring mandates the use of respiratory protection, work operations will be shut down and the following will occur:

- All properly trained and medically qualified personnel, as directed by the SSO, will inspect their respirators, clean them as necessary, ensure proper function, and don.
- All personnel shall perform both negative and positive pressure respirator fit tests. If a respirator failure is noticed, it shall be immediately reported to the SSO and the defective respirator will be repaired or replaced.
- In the event respirator repairs or replacement cannot be made, the affected employee shall be removed from the work area until such time as a properly functioning and fitting respirator has been acquired.
- Each employee shall ensure that his/her individual respirator is equipped with cartridges appropriate for the type(s) of contaminants described in Table 2.



Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 35
October 4, 2006

Common cartridge types are organic vapor, particulate, or combination organic vapor/acid gas/particulate cartridges. Avocet and its contractors are responsible for having replacement cartridges available onsite for their respective employees.

- Work operations will resume once all employees have donned respiratory and, if necessary, dermal protection and the SSO is satisfied that all PPE is in place and properly functioning.
- Air quality monitoring will continue as described in Section 4.0.
- If it is determined that half-face respirators are not adequate for the vapor concentrations recorded, work shall cease and the appropriate respiratory protection obtained and/or engineering controls implemented. The SSO will ensure that only appropriately trained personnel who have been fit-tested with “upgraded” respiratory protective equipment will be utilized in continued operations.

Within certain limits, respirators protect workers from inhaling toxic contaminants. Various respirator systems provide different levels of protection. Protection factors (PFs) provided by various respiratory protection devices are presented below.

Selected Respirator Protection Factors

Respiratory Device	*Protection Factor (PF)
Air-Purifying Respirator - Half-face	10x
Air-Purifying Respirator - Full-face	50x
Supplied Air Pressure Demand Full-face (Airline)	200x
Self-Contained Breathing Apparatus (Positive Pressure)	10,000x

* OSHA-assigned PFs for each respirator device in the OSHA Handbook Guidelines

The PF is the ratio of the atmospheric contaminant concentration to that of the concentration inside the respirator face piece. PFs may be used to calculate the Maximum Use Limit (MUL) of a properly fit-tested respirator. Avocet requires that contractors and employees be equipped at a minimum with a properly fitted half-face air purifying respirators. Thus, Avocet’s maximum PF is 10 times (10x). If a higher PF is required, full face respirators may be used, engineering controls implemented or specially trained personnel fitted with SCBA’s used for the work activities.

A project-specific chemical hazard evaluation is provided in Table 2. MSDS/NIOSH chemical hazards sheets are presented in Appendix B.

Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 36
October 4, 2006

12.1.1 Respirator and Cartridges

If Level C PPE is required, workers will don a NIOSH/Mine Safety and Health Administration (MSHA)-certified full-face or half-face APR equipped with NIOSH/MSHA-approved cartridges. The specific type of cartridge for the subject project is identified in Section 4.0. The SSO will verify that the appropriate chemical cartridge is used with the APR. Improperly installed or wrongly selected chemical cartridges will provide inadequate or no protection.

All cartridges will be changed a minimum of once daily. However, water saturation of filters or dusty conditions may necessitate more frequent changes. More importantly, cartridges will also be changed if workers begin to experience increased inhalation resistance or chemical breakthrough. Respirators will be checked by the SSO prior to the beginning of site work and periodically thereafter. However, individual workers are responsible for inspecting their respirators before each use as well as cleaning and decontaminating them after each use.

Fit testing of all personnel that wear negative pressure air-purifying respirators will be conducted annually using isoamyl acetate or irritant smoke. The fit test will be for the style and size of the respirator to be used. The fit test will be documented and the results filed with the employee's personnel medical records. In addition, each time a respirator is used in the field, a positive and a negative fit test will be conducted.

APRs provide no protection in an oxygen-deficient atmosphere.

12.2 LEVEL D PPE

Level D represents the minimum level of personal protection on any Avocet project. It is used only as a work uniform and in areas where no respiratory or skin hazards are present. The work party in the support zone will use Level D PPE. The PPE listed in the following table may be revised by the SSO based on work activities being conducted.

LEVEL D REQUIRED EQUIPMENT

- | | |
|---|--|
| • <i>Hard hat</i> | • <i>Long-sleeve shirt</i> |
| • <i>Chemical goggles or safety glasses with side shields</i> | • <i>Steel-toed boots with chemical-resistant soles</i> |
| • <i>Ear plugs, if needed</i> | • <i>Disposable overboots (chemical protective, latex or PVC), if needed</i> |
| • <i>Fluorescent traffic safety vest</i> | • <i>Work gloves and/or nitrile gloves</i> |
| • <i>Long pants or coveralls</i> | • <i>Dust mask, if needed</i> |
| • <i>Tyvek (optional)</i> | |

Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 37
October 4, 2006

12.3 LEVEL C PPE

Level C protection is used when air-purifying respirators are needed for respiratory protection and/or when a low level of skin protection is needed. If Level C protection is required, the PPE listed in the following table will be used but may be revised by the SSO based on the work activities being conducted.

LEVEL C REQUIRED EQUIPMENT	
<ul style="list-style-type: none">• <i>Hard hat</i>• <i>Chemical goggles or safety glasses with side shields</i>• <i>Ear plugs (if needed)</i>• <i>Fluorescent traffic safety vest</i>• <i>Long trousers or coveralls</i>• <i>Long-sleeve shirt</i>• <i>Coated Tyvek</i>	<ul style="list-style-type: none">• <i>Steel-toed boots with chemical-resistant soles</i>• <i>Disposable overboots (chemical protective, latex or PVC)</i>• <i>Inner gloves (latex), if needed</i>• <i>Outer gloves (nitrile)</i>• <i>Full-face or half-face, air-purifying respirator with approved vapor cartridges</i>

12.4 LEVEL B PPE

Level B is used when supplied air is needed for respiratory protection and a higher level of skin protection is needed. Level B protection is not necessary for most projects and is not addressed in this HASP. If conditions warrant an upgrade to Level B PPE, an amendment to this HASP will be prepared and approved by the HSD.

12.5 LEVEL A PPE

Level A protection is used when the highest levels of respiratory and skin protection are considered necessary. Like Level B, Level A protection is not necessary for most projects and is not addressed in this HASP. If conditions warrant an upgrade to Level A PPE, an amendment to the HASP will be prepared and approved by the HSD.

Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 38
October 4, 2006

12.6 ADDITIONAL SAFETY EQUIPMENT

The additional safety equipment listed in the following table will be used as needed.

<i>ADDITIONAL SAFETY EQUIPMENT FOR USE AS NEEDED</i>	
<ul style="list-style-type: none">• <i>Wind direction indicator</i>• <i>Heat stress monitor</i>• <i>Air horns</i>• <i>Portable eyewash station</i>• <i>Fire extinguisher</i>• <i>Flashlight</i>• <i>Hand-held two-way radios</i>• <i>Long-handled brushes</i>• <i>Rain suit</i>• <i>First aid kit</i>	<ul style="list-style-type: none">• <i>Snakebite kit</i>• <i>Warning tape</i>• <i>Traffic cones, delineators</i>• <i>Barrier tape</i>• <i>Various size containers</i>• <i>Plastic lines</i>• <i>Plastic drop cloths</i>• <i>Bench or stools</i>• <i>Sunscreen lotion</i>

Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 39
October 4, 2006

13.0 DESIGNATED WORK AREAS

Exclusion zones, contamination reduction zones, and support zones around work areas will be defined by the SSO based on the tasks to be completed. Barrier tape and delineators will be used to define the work zones as appropriate. The use, size, and locations of the work areas will be dictated by the work activity, the presence of existing structures, and other site-specific restrictions.

No eating, drinking, or smoking shall be allowed in the designated work areas. Work zone boundaries will be clearly identified and may be relocated, as appropriate, as the work progresses.

13.1 SUPPORT ZONE

The “support zone” is the area around or adjacent to the principal work area, in which the possibility of encountering hazardous materials is minimal. Therefore, personal protective and respiratory equipment are not necessary. Inside the support zone, the following will be available:

- An effective means of communication
- First aid supplies
- Fire extinguisher
- Drinking water
- Sanitation facilities
- Wind indicator
- Other appropriate support facilities

13.2 CONTAMINATION REDUCTION ZONE

The “contamination reduction zone” is the area where equipment and personnel are decontaminated after leaving the exclusion zone. Personnel will remove and decontaminate PPE and place it in the appropriate containers. Site vehicles and equipment will also be decontaminated in the contamination reduction zone. The contamination reduction zone will consist of a decontamination pad (temporary or permanent); a means of washing protective equipment, site vehicles, and equipment; containers for liquid, solids, and PPE; first aid supplies; an eyewash/emergency shower; and a fire extinguisher.

13.3 EXCLUSION ZONE

The “exclusion zone” includes the area where work activities will be conducted (e.g., drilling, sampling, excavation, etc.). Only authorized, trained, and qualified personnel with the appropriate personal and respiratory equipment shall be admitted.

**Health and Safety Plan
Groundwater Well Installation**

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 40
October 4, 2006

Work activities in the exclusion zone pose the greatest possibility of exposure to hazards. The SSO shall be responsible for controlling the access points and keeping bystanders and unauthorized personnel from entering. The exclusion zone will be clearly marked with flagging, barricade tape, traffic cones, or other access restriction devices.

Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 41
October 4, 2006

14.0 DECONTAMINATION PROCEDURES

Decontamination procedures will be performed within the contamination reduction zone using a portable decontamination station. The portable decontamination station will consist of three decontamination buckets and associated ancillary equipment (brushes, etc.). These stations will be maintained within the exclusion zone. If necessary, a self-contained steam cleaning unit may be provided. Appropriate receptacles for disposal of miscellaneous equipment, PPE, and decontamination water and rinsate will be provided. Decontamination procedures are presented below.

14.1 PERSONNEL

The following procedures will be followed for decontaminating workers:

- Chemical-resistant gloves shall be worn when handling soil or ground water.
- Personnel leaving the exclusion zone will wash, rinse, and remove gloves and wash hands and face in clean water using soap.
- If wearing Level C dermal and respiratory protection, prior to exiting the exclusion zone, personnel will wash, rinse, and remove gloves and boots. Remove Tyvek and place in a plastic trash bag. Wash hands and face in clean water using soap.
- Respirators will be cleaned and sanitized prior to each use. Avocet will provide a sanitizing agent such as MSA Cleaner-Sanitizer II for this purpose.

14.2 EQUIPMENT

The following procedures will be followed for decontaminating equipment:

- Hand tools and equipment to be removed from the site during or after investigation activities will be washed with brushes in a non-phosphate detergent (such as Alconox[®]) in water, rinsed with tap water, and final rinsed with distilled water.
- Large heavy equipment to be removed from the work zone will be decontaminated as necessary.



Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 42
October 4, 2006

15.0 WASTE MANAGEMENT

Daily housekeeping and management of waste/debris at the site will include, but not be limited to, the following activities:

- Cuttings from soil sampling or well borings will be placed in United Nations (UN)-rated 17H 55-gallon, liquid-tight drums, stored in covered soil storage bins, or otherwise isolated from the underlying ground surface and ambient weather conditions.
- Well development and purge water will be placed in UN-rated 17H 55-gallon liquid-tight drums, steel or polyethylene tanks (including Baker Tanks and Poly tanks), or collected directly in vacuum trucks. Decontamination rinsate will be handled in a similar manner but may be segregated from well development and purge water.
- If present, LNAPL and dense, non-aqueous phase liquid (DNAPL) will be separated, to the extent practical, from well development and purge water and sealed in DOT-rated 17H 55-gallon liquid-tight drums or collected directly in vacuum trucks.
- Containers will be appropriately labeled prior to leaving the site.
- Work locations will be tidied and cleaned at the end of each day.
- Garbage, used PPE, and miscellaneous debris may be placed in conventional garbage containers unless potentially hazardous materials may have contaminated it. If potentially contaminated, such materials will be handled as described above for soil cuttings.
- Equipment remaining onsite overnight will be stored in a neat, safe, and secure fashion.

**Health and Safety Plan
Groundwater Well Installation**

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 43
October 4, 2006

16.0 SANITATION FACILITIES

Proper sanitation facilities will be available at the work site. These facilities will be located in the support zone and may include, but are not limited to:

- Washing facilities
- Toilets
- Showers

If there are no existing sanitation facilities at the site or nearby that can be used, portable units will be provided. Water and soap to wash hands and face will be available near the work area. Wastes from portable sanitary facilities will be removed at a minimum of once per week. The location of these facilities will be highlighted on the site map.

Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 44
October 4, 2006

17.0 SITE SECURITY AND CONTROL

This section addresses site security, normal work hours, and requirements pertaining to after hours and weekend operations.

17.1 SITE SECURITY

Site security is typically the responsibility of Avocet's clients and most projects are performed inside already secure facilities. In the event that work is to be performed in unsecured areas, project-specific site security measures will be implemented. Project-specific site security measures, if required, are described in Section 4.0. In general, however, security may be achieved by erecting temporary chain-link fences or by providing security guards outside working hours. Under no circumstances will open borings or open excavations be left unguarded or accessible to the general public. Security guards, if used, must be equipped with vehicles, flashlights, and two-way radios.

17.2 WORK HOURS

Unless specifically planned and provided for, work at the site will be conducted during daylight hours, between 7:00 a.m. and 7:00 p.m. The maximum workday will typically not exceed 12 hours unless relief shift workers are available.

17.3 AFTER HOURS/WEEKEND OPERATIONS

On-site activities may be performed after hours to avoid disruption of facility operations and/or traffic in public rights-of-way. After hours work may also be necessary for certain activities that, once started, must be finished in a single continuous operation. Examples include certain drilling and well installation activities where the stability of the boring may be jeopardized by lengthy interruptions.

Activities performed after dark will require the use of lights that provide a minimum light intensity of 30 foot-candles. Due to the low light and shadows, extra care will be used when operating equipment. In addition, employees must be aware of any activities occurring off site in the surrounding neighborhood. If off-site activities appear to put workers in danger, the police should be notified immediately. The police should also be contacted prior to beginning night work so they are aware of the planned activities. Additional security measures during night work, such as hiring a security guard, will be taken as necessary.

If there is a potential for gang activity, caution should be taken not to wear certain colors and clothing (identified at the start of the project).

Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 45
October 4, 2006

18.0 TRAINING AND MEDICAL SURVEILLANCE REQUIREMENTS

This section addresses hazardous waste training and medical surveillance requirements for Avocet and its contractors.

18.1 HAZARDOUS WASTE OPERATIONS TRAINING

All site personnel, including contractor personnel, will have successfully completed a 40-hour and annual 8-hour refresher course, if required, in health and safety for hazardous waste site operations (HAZWOPER).

Contractors will be required to provide proof of the above-referenced training to Avocet before they begin work at the site. A list of all trained and authorized personnel from each contractor shall be submitted to Avocet prior to commencement of field activities. Only those personnel that appear on the list, or personnel who have the required documentation, will be allowed onsite.

18.2 HAZARD COMMUNICATION PROGRAM

The purpose of a Hazard Communication or Employee Right-To-Know program is to ensure that potential chemical hazards are communicated to the potentially affected workers. A written hazard communication program has been established by Avocet and includes the following:

- *Container Labeling* – Site personnel will ensure that all drums and containers are labeled according to contents. All labels will be checked for identity, hazard warning, and name and address of the responsible party.
- *Hazardous/Toxicity Information or MSDS* – There will be either a NIOSH Guide to Chemical Hazards onsite or this HASP will include an MSDS for each hazardous chemical used or known to be onsite.
- *Employee Information and Training* – Employees are trained on the general hazards of chemicals and the use of MSDSs through formal annual training. Project-specific chemical hazards are communicated to workers through an initial site safety meeting and during the daily site safety meetings.

The written hazard communication or employee right-to-know program is available in Avocet's office for review by personnel. Through this program, workers are instructed in the following:

- Chemicals in the work area and their hazards.
- Ways to prevent exposure to hazardous chemicals.
- Company plans and procedures to prevent worker exposure to these chemicals.
- Procedures to follow if they are exposed to hazardous chemicals.
- How to read and interpret labels and MSDS for these chemicals.



Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 46
October 4, 2006

- Emergency spill procedures and equipment.
- Proper storage, labeling, and disposal of hazardous chemicals.

18.3 SITE-SPECIFIC PRE-JOB TRAINING

All field personnel will be trained in the general and specific hazards unique to the project prior to starting work. Their signatures on the Health and Safety Meeting documentation page of the HASP will document receipt of this one-time training. The following topics will be discussed:

- Personnel responsible for site safety
- Identification of first aid- and cardiopulmonary resuscitation (CPR)-trained personnel
- Health and safety hazards onsite
- Location, use, and care of PPE
- Location of all safety equipment
- Location of the HASP
- Site standard operating procedures and safe working practices
- Site work zones and confined space
- Site control measures
- Air monitoring procedures
- Emergency information and procedures

18.4 DAILY SITE SAFETY TRAINING

Site safety training meetings will be held prior to beginning work each day to discuss the potential hazards of work activities to be completed during the day and any special hazards associated with the project.

18.5 MEDICAL SURVEILLANCE

On an annual basis, a medical doctor will pass all site personnel as physically fit and capable of wearing respiratory protection. Workers that cannot provide documentation in support of this requirement will not be permitted to work at the site. The HSD will be responsible for personnel document verification and follow-up activities related to accident loss reports submitted by the Project Manager.

Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 47
October 4, 2006

19.0 EMERGENCY RESPONSE PLAN

Potential site emergencies include, but are not limited to, fire, earthquake, heat stroke, and other physical or chemical injuries that require immediate medical attention. The SSO will respond to on-site emergencies, direct site evacuation, summon emergency assistance as necessary, and contact the Project Manager and HSD. The SSO will turn over the responsibility for coordination of an emergency situation to appropriate emergency personnel upon their arrival.

19.1 PRE-EMERGENCY PLANNING

Emergency contacts, telephone numbers, and the hospital route will be readily available at the site. A place of refuge and/or emergency meeting place will be designated by the SSO at the daily safety meeting. Following an evacuation pursuant to a site emergency, field personnel will meet at the designated meeting place for a head count. Plans for a safe and effective response to potential emergencies will be developed by the SSO before daily field activities begin. Pre-emergency planning includes reviewing the emergency response plan with site personnel and inspection of emergency response equipment and supplies.

19.2 PERSONNEL ROLES, LINES OF AUTHORITY, AND COMMUNICATION

In the event of an emergency, the SSO must be notified. The SSO is responsible for responding to the immediate emergency situation. The initial response may include, but is not limited to, notifying on-site personnel, evacuating the area, and notifying the appropriate emergency response authorities, as needed. The SSO shall inform the HSD and Project Manager that an emergency situation has occurred. However, all field personnel present at the site have the authority and responsibility to report a site emergency.

19.3 EMERGENCY RECOGNITION AND PREVENTION

The likelihood of emergencies occurring will be minimized through proper supervision, employee training, and site management. The impact of the emergency situation will be minimized to the extent possible.

19.4 SITE RESOURCES/EMERGENCY EQUIPMENT

The locations of site resources and emergency equipment will be discussed at the site safety orientation meeting prior to commencement of site work.

19.5 EMERGENCY SIGNALS

In the event that an emergency situation occurs, all work activities at the site will cease. The repeated sounding an on-site vehicle horn will signal an emergency situation. If verbal communication is difficult, impractical, or impossible, the following hand/body emergency communication signals will be used:



Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 48
October 4, 2006

Signal	Meaning
Hands clutching throat	Can't breath/choking
Hands on top of head	Need assistance
Thumbs up	OK/I'm all right/I understand
Grip another person's wrist or both hands on another person's wrist	Leave area immediately

If an emergency occurs in the exclusion zone and if time allows, personnel wearing Level C PPE or greater, shall remove their PPE before exiting the exclusion zone. If the emergency is life threatening, however, workers should leave the area immediately.

19.6 SAFE DISTANCES AND PLACES OF REFUGE

In an emergency, field personnel should stay calm and summon help as needed. Wind socks or ribbons will be visible to field personnel in the work area to indicate wind conditions. If evacuation is necessary, field personnel should leave the work area immediately by the shortest route possible and assemble at a predetermined location upwind of the work area activities. The assembly point will be determined by the SSO in conjunction with the on-site contractors in advance of each work activity. The assembly location depends on work area and wind direction, and may vary from day to day. This assembly point will be at a safe distance from the emergency situation. In the event that refuge must be taken, the SSO will direct personnel to that location. Field personnel must not re-enter the work area until the SSO has determined that it is safe to do so.

19.7 EMERGENCY SITE SECURITY AND CONTROL

In the event of an emergency, the SSO or designated alternate will control access and traffic to the work zones. If outside emergency services, such as the fire department, police, or paramedics, have been summoned, the SSO will turn over responsibility for the emergency situation upon their arrival.

19.8 SITE EVACUATION ROUTE

A map showing the site emergency evacuation route will be provided and posted onsite prior to beginning field work. If an emergency requires evacuation, the SSO will alert field personnel by sounding a vehicle horn or other alarm. Field personnel will immediately leave the work area through the predetermined evacuation route. The SSO will conduct a head count of evacuated field personnel to ensure that all site personnel are accounted for.

When working in areas such as parking lots or between buildings, equipment and vehicles must be located to provide sufficient room for safe working practices and escape routes in case an emergency requires evacuation.



Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 49
October 4, 2006

19.9 CONTINGENCY PROCEDURES

Life-threatening incidents, such as fire, explosion, or a hazardous material spill or release, may warrant evacuation. All persons should be removed from the affected area immediately in accordance with the site emergency evacuation route. Medical assistance should be obtained if necessary. All on-site personnel should immediately be notified of the emergency situation. The local fire department should be contacted to assist in the event of a fire or spill.

19.9.1 Cave-In

In the event that workers are trapped or otherwise affected by a cave-in of an open excavation, the following procedures shall be followed:

Summon emergency services and stop all work

If possible, remove injured personnel from the cave-in **WITHOUT** entering the excavation

Wait for emergency services

19.9.2 High VOC Levels in Work Zone

Worker exposure to excessive VOC concentrations is not likely to constitute an emergency response scenario because air quality monitoring will typically provide an early warning, thus providing the time to don the appropriate levels of PPE. As such, a comprehensive air quality monitoring program in the breathing zone will be the basis for Avocet's approach to this potential emergency response scenario. However, if VOC concentrations in the breathing zone are higher than the levels established for the current PPE, the following actions will be taken:

- Evacuate workers to an area located upwind of the work area.
- Upgrade current PPE to the next level that corresponds to the air monitoring levels detected, or implement vapor suppressant controls to mitigate the high VOC readings to a level corresponding to the current PPE level.

19.9.3 High VOC Levels at Site Perimeter

If continuous readings of VOC concentrations greater than background levels occur at the site perimeter, vapor suppression measures will be implemented. These measures may include wetting exposed soil surfaces, applying foam or other vapor suppression measures, or simply reducing the area of exposed soil in excavations or stockpiles using polyethylene sheeting.

19.9.4 Fire

All field personnel are authorized to use a fire extinguisher if the fire is small and does not endanger their health or life, is caused only by project operations, and is within their ability to control. Smoking is not permitted in designated work areas. Open flames and spark producing equipment are prohibited in areas where flammable liquids or gases are used or may be generated. Open flames are prohibited within 75 feet of points where flammable liquids or gases may accumulate. An electrical bond must be maintained between containers when flammable

Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 50
October 4, 2006

liquids are transferred, and equipment must be grounded. Any rags or other waste materials soaked with combustible or flammable liquid must be disposed of in a closed container. Heavy equipment and vehicles will each be equipped with a fire extinguisher.

In the event of a fire or explosion, the area will immediately be evacuated and the fire department summoned as soon as possible. Air or vehicle horns will be used to alert all site personnel of the fire and evacuation. If time permits, workers in the *exclusion zone* will exit through the contamination reduction zone and take off or scrub their outer boots and remove their outer suit prior to leaving for the assembly location. Site personnel will gather at a designated location upwind of the predominant wind direction. The location will be established during the daily safety meeting in the morning and a head count will be taken. Upon arrival, the Fire Department will be advised of the location and nature of the fire and the location and identification of hazardous and flammable materials onsite. At that point the SSO will turn over responsibility for coordination to the Fire Department.

If it is safe to do so, site personnel may perform the following:

- Use available on-site fire extinguisher to control or extinguish the fire if it is a small, localized fire.
- Remove or isolate flammable or other hazardous materials that may contribute to the fire.

19.9.5 Flash Flood

If a flash flood warning is issued, climb to higher ground. Seek shelter on stable ground. Do not stay in an area where there is uncompacted material on a steep slope.

19.9.6 Material Spills

All field personnel are authorized to contain hazardous material spills by taking appropriate actions, such as immediate diking and cleanup, if the spill is created by project field activities. The equipment and all work areas will be maintained in a clean, proper working order. Caution will be exercised at all times to prevent spilling materials generated during field activities. In the event that project generated materials are spilled, response actions must be initiated by first contacting the SSO. Proper PPE and spill cleanup materials will be available onsite.

Hazardous material spills will be contained by immediate diking the impacted area and using spill cleanup materials present onsite. Containment of spills by field personnel during field activities is limited to those materials generated during work performed by project personnel.

Project personnel are not authorized or trained for a hazardous materials response to contain spills of other materials onsite. Field personnel are instructed to call the client contact and/or emergency response number if they witness a spill of hazardous materials other than materials generated during project field activities.

Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 51
October 4, 2006

19.9.7 Earthquake

Any personnel inside a building during an earthquake should remain indoors and take cover under a desk, in a doorway, or against an inside wall. Personnel should stay away from windows and light fixtures. If outdoors, personnel should move to an open, clear area away from buildings, tanks, heavy equipment, aboveground piping, and power lines.

19.9.8 Severe Weather

Electrical Storms

- Seek shelter at the support facility or in field vehicles.
- Do not stand near or under high objects, such as trees and drilling rigs.

High Winds

- Seek shelter at the support facility (if anchored) or in field vehicles.
- Do not drive high profile vehicles at high speeds.
- Park vehicles heading into the wind.
- Wear respiratory protection and safety goggles in dusty conditions.

Heavy Rain or Hail

- Seek shelter at the support facility or in field vehicles.
- Do not attempt to drive a vehicle if you are in an area that is or has the potential for flooding.

Tornados

- Seek shelter underground or in a closet, bathroom, or interior of a substantial building. Get under something sturdy and cover your head.
- Do not stay in a trailer vehicle. Leave the trailer or vehicle and lie flat in the nearest ditch if substantial shelter is not available.
- Stay away from large areas of glass.
- Stay away from large unsupported roofs.

19.9.9 Vehicle Accidents

Steps should be taken to avoid accidents:

- Be aware of the existence of pedestrian and vehicle traffic.
- Vehicle operators and passengers should wear seat belts/shoulder harness at all times.
- Follow local vehicle codes and stay within posted and safe speed limits.

Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 52
October 4, 2006

- Drive and park vehicles only on roadways that can be negotiated safely.
- Drive company vehicles professionally and care for them as you would your own property. Only drive vehicles that are safe and within maintenance specifications.
- Practice defensive driving.
- Lock vehicles to prevent theft.
- To minimize the risk of injury, pedestrians should walk on the left hand side of roadways, opposing vehicle traffic.
- Pedestrians should maintain awareness of all vehicular traffic.
- Pedestrians should not stand or walk near backhoe buckets or other earth moving equipment.
- Pedestrians should avoid areas where heavy equipment is operating.

Minor accidents or “near misses” will be reported to the SSO so that the circumstances can be investigated and a repeat avoided. In the event of a serious accident or an accident involving two moving vehicles, the SSO shall be notified immediately and outside emergency services summoned as necessary. A serious accident or an accident involving two moving vehicles will also be reported in accordance with local law enforcement and Department of Motor Vehicle regulations.

19.9.10 Workplace Violence

Steps should be taken to avoid workplace violence:

- Avoid individuals or situations that may lead to workplace violence.
- Report any such individuals or situations to your supervisor and/or security personnel.
- Report any unauthorized personnel, suspicious activities, or unauthorized vehicles to your supervisor and/or security personnel.

19.9.11 Emergency Decontamination Procedures

In the event of chemical exposure requiring decontamination, personnel should remove contaminated clothing, rinse skin with large amounts of water, and seek medical attention.

19.10 EMERGENCY MEDICAL TREATMENT AND FIRST AID

In the event of personal injury or illness, professional medical assistance should be summoned as appropriate.

First aid to stabilize workers needing assistance will be given only by qualified personnel trained in first aid. Life support techniques such as CPR and treatment of life-threatening problems such

Health and Safety Plan Groundwater Well Installation

Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

Page 53
October 4, 2006

as bleeding, airway blockage, and shock will be rendered immediately. Professional medical assistance will be obtained at the earliest possible opportunity.

First aid equipment and supplies will be accessible at all times. Professional ambulance services will be used to provide prompt medical attention and transportation. A portable fire extinguisher will be available at all times.

19.11 EMERGENCY ALERTING AND NOTIFICATION PROCEDURES

Should an accident occur in the field, the nearest appropriate facility (i.e., medical facility, fire department, police department) will be notified immediately. Avocet will rely on professional medical service providers for response to medical emergencies. Though individuals with first aid/CPR training may be present onsite, this HASP does not require the presence of such individuals. General procedures are as follows:

- **In the event of fire or other emergency dial 911** or the telephone number of the onsite emergency response unit if available (refer to Emergency Telephone Numbers).
- Seek medical attention for the injured person immediately.
- Notify the SSO, Project Manager, and the injured person's office.
- Prepare an incident report. The Project Manager is responsible for its completion and submittal to the HSD and the client within 24 hours.
- The SSO will assign duties and coordinate with emergency response personnel as required.

However, to ensure appropriate legal reporting requirements relating to a reportable quantity (RQ) material release, the National Response Center (NRC) should be contacted. Additional emergency assistance for handling material releases can be obtained by calling CHEMTREC. The phone numbers are:

National Response Center (NRC)	1-800-424-8802
CHEMTREC	1-800-424-9300



Tables

Table 1
Project Work Activities and Hazards Identification
Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

✓ ⁽¹⁾	WORK ACTIVITIES	POTENTIAL HAZARDS ⁽²⁾							
		Mechanical	Electrical	Chemical	Temperature	Acoustic	Biological	0, Deficiency Confined Space	Physical
✓	Supervision of contractors or subcontractors	Heavy equipment	NA	Potentially in air	Heat stress	Heavy equipment	NE	NA	Traffic, dust, debris, and open excavation
✓	On-site or off-site air monitoring	NA	NA	Potentially in air	Heat stress	NA	NE	NA	Traffic, dust, debris, and open excavation
	Soil boring	Hand-drilling or heavy equipment	Overhead and buried power lines	Potentially in soil, ground water, and air	Heat stress	Heavy equipment	NE	Inside excavation	Traffic, dust, debris, open excavation, and cave-in
	Soil sampling	Hand-drilling equipment and heavy equipment	Overhead and buried power lines	Potentially in soil and air	Heat stress	Heavy equipment	NE	Inside excavation	Traffic, dust, debris, open excavation, and cave-in
	Soil gas sampling	Hand-drilling equipment and heavy equipment	Overhead and buried power lines	Potentially in soil and air	Heat stress	Heavy equipment	NE	Inside excavation	Traffic, dust, debris, open excavation, and cave-in
✓	Ground water well installation or development	Heavy equipment	Overhead and buried power lines	Potentially in soil, ground water, and air	Heat stress	Heavy equipment	NE	NA	Traffic, dust, and debris
✓	Ground water sampling	Hand bailer, pump, and heavy equipment	Generator and overhead lines	Potentially in ground water	Heat stress	Heavy equipment	Insects in well boxes	NA	Traffic, dust and debris
✓	Excavation, trenching, backfilling, or resurfacing	Heavy equipment	Overhead and buried power lines	Potentially in soil and air	Heat stress	Heavy equipment	NE	Inside excavation or trench	Traffic, dust, debris, open excavation, and cave-in
✓	Concrete coring, sawing, or removal	Heavy equipment	Overhead and buried power lines	Potentially in soil and air	Heat stress	Heavy equipment	NE	NA	Traffic, dust and debris
	Surveying	NA	NA	Potentially in air	Heat stress	NA	NE	Inside excavation or trench	Traffic, dust, debris, and open excavation

Table 1
Project Work Activities and Hazards Identification
Boeing Realty Corporation Former C-6 Facility
Los Angeles, California

✓ ⁽¹⁾	WORK ACTIVITIES	POTENTIAL HAZARDS ⁽²⁾							
		Mechanical	Electrical	Chemical	Temperature	Acoustic	Biological	0, Deficiency Confined Space	Physical
✓	Sample equipment decontamination	Pumps	Generator	Potentially in water	Heat stress	Generator	NE	NA	NA
✓	Sample equipment decontamination	Bailers	NA	Potentially in water	Heat stress	NA	NE	NA	NA
	Sample equipment decontamination	Soil sampler	NA	Potentially in soil and water	Heat stress	NA	NE	NA	NA
✓	Decontamination of drilling equipment	Heavy equipment	NE	Potentially in soil & water	Heat stress	Heavy equipment	NE	NA	Traffic, dust and debris
	Construction and remediation equipment installation	Heavy equipment	Potential shock during connect and disconnect	Chemicals in PVC glue	Heat stress	Heavy equipment	Rodents and/or spiders in piping	NA	Traffic, dust and debris
	Equipment monitoring and maintenance	Belts and moving parts	Shock from equipment or power source	Solvents and lubricants	Heat stress	Heavy equipment	Rodents and/or spiders	NA	Traffic, dust, and debris
	Vapor and separator water sampling	Belts and moving parts	Shock from equipment or power source	Potentially in the vapor and water	Heat stress	Equipment noise	NE	NA	NA
	AST sampling	Heavy traffic	NA	Potentially in air and tank contents	Heat stress	Equipment noise	NE	Inside of tank	NA
	UST sampling	Heavy traffic	NA	Potentially in air and tank contents	Heat stress	NA	NE	Inside of tank	Traffic, dust and debris
	UST cleaning and removal	Heavy equipment	Overhead & buried power lines	Potentially in air and tank contents	Heat stress	Heavy equipment	NE	Excavation	Traffic, dust, debris, and open excavation

(1) ✓ = Applicable work activity for the project.

(2) Control measures to mitigate the potential hazards are identified in Section 5.0 of the HASP: Task Hazards and Required Control Measures.

NA = Not applicable.

NE = Not expected.

Table 2
Chemical Toxicity and Exposure Information
Boeing Realty Corporation Former C-6 Facility
Los Angeles, California
Page 1 of 2

<i>C.A.S. No.</i>	<i>Contaminant Name (Synonyms)</i>	<i>Appearance & Physical Form (Pure substance)</i>	<i>Odor Threshold⁽¹⁾</i>	<i>Vapor Pressure</i>	<i>LEL UEL</i>	<i>Cal/OSHA Permissible Exposure Limits (TWA)</i>	<i>STEL CEILING</i>	<i>IDLH</i>	<i>Routes of Entry</i>	<i>Target Organs</i>	<i>Potential Health Effects (Acute & Chronic)</i>	<i>Ionization Potential</i>	<i>Comments</i>
71-43-2	Benzene (Benzol; Phenyl Hydride)	Colorless to light-yellow liquid with an aromatic odor [Note: A solid below 42°F]	4.68 ppm	75 mmHg	1.2% 7.8%	1 ppm	5 ppm NA	500 ppm	Inhalation, skin absorption, ingestion, skin and/or eye contact	Eyes, skin, respiratory system, blood, central nervous system, bone marrow	Irritation eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, lassitude (weakness, exhaustion); dermatitis; bone marrow depression; potential occupational carcinogen	9.24 eV	NIOSH REL is 0.1 ppm and STEL is 1 ppm See California Title 8, Section 5218
78-93-3	2-Butanone (MEK ; Ethyl Methyl Ketone; Methyl Acetone; Methyl Ethyl Ketone)	Colorless liquid with a moderately sharp, fragrant, mint- or acetone-like odor	10 ppm	78 mmHg	1.4% 11.4%	200 ppm	300 ppm TLV	3,000 ppm	Inhalation, ingestion, skin and/or eye contact	Eyes, skin, respiratory system, central nervous system	Irritation to eyes, skin, nose; headache; dizziness; vomiting; dermatitis	9.54 eV	
75-34-3	1,1-Dichloroethane (Asymmetrical dichloroethane; Ethylidene chloride; 1,1-Ethylidene dichloride)	Colorless, oily liquid with a chloroform-like odor	120 ppm (Spectrum)	182 mmHg	5.4% 11.4%	100 ppm	NA NA	3,000 ppm	Inhalation, ingestion, skin and/or eye contact	Skin, liver, kidneys, lungs, central nervous system	Irritation to skin; central nervous system depress; liver, kidney, lung damage	11.06	
75-35-4	1,1-Dichloroethene (1,1-DCE ; 1,1-Dichloroethylene; VDC; Vinylidene Chloride; Vinylidene Chloride Monomer; Vinylidene Dichloride)	Colorless liquid or gas (above 89°F) with a mild, sweet, chloroform-like odor	500 ppm (Spectrum)	500 mmHg	6.5% 15.5%	1 ppm	NA NA	NE	Inhalation, skin absorption, ingestion, skin and/or eye contact	Eyes, skin, respiratory system, liver, kidneys, central nervous system	Irritation to eyes, skin, throat; dizziness; headache; nausea; dyspnea (breathing difficulty); liver and kidney disturbance; pneumonitis; potential occupational carcinogen	10.00	
540-59-0	cis-1-2-Dichloroethene (1,2-Dichloroethylene; Acetylene Dichloride; Cis-Acetylene Dichloride; Trans-Acetylene Dichloride; Sym-Dichloroethylene)	Colorless liquid (usually a mixture of the cis & trans isomers) with a slightly acrid, chloroform-like odor	Currently not available	185 to 265 mmHg	5.6% 12.8%	200 ppm	NA NA	1,000 ppm	Inhalation Ingestion Contact	Eyes, respiratory system, central nervous system	Irritation to eyes, respiratory system; depressed central nervous system	9.65 eV	
7439-92-1	Lead (Lead Metal; Plumbum)	A heavy, ductile, soft, gray solid	Currently not available	0 mmHg (approx)	NA NA	0.050 mg/m ³	NA	100 mg/m ³	Inhalation, ingestion, skin and/or eye contact	Eyes, gastrointestinal tract, central nervous system, kidneys, blood, gingival tissue	Lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; Irritation to eyes; hypotension	NA	
71-55-6	1,1,1-Trichloroethane (TCA ; Methyl Chloroform; Chloroethene)	Colorless liquid with a mild, chloroform-like odor.	100 ppm	100 mmHg	7.5% 12.5%	350 ppm	450 800 ppm	700 ppm	Inhalation, ingestion, skin and/or eye contact	Eyes, skin, central nervous system, cardiovascular system, liver	Irritation to eyes, skin; headache, lassitude (weakness, exhaustion), central nervous system depression, poor equilibrium; dermatitis; cardiac arrhythmias; liver damage	11.00 eV	
79-01-6	Trichloroethylene (TCE ; Trichloroethene; Ethylene Trichloride; Ethinyl Trichloride; Trilene)	Colorless liquid (unless dyed blue) with a chloroform-like odor	50 ppm	58 mmHg	8% 10.5%	25 ppm	100 ppm 300 ppm	1,000 ppm	Inhalation, skin absorption, ingestion, skin and/or eye contact	Eyes, skin, respiratory system, heart, liver, kidneys, central nervous system	Irritation to eyes, skin; headache; visual disturbance; lassitude (weakness, exhaustion); dizziness; tremor; drowsiness; nausea; vomiting; dermatitis; cardiac arrhythmias, paresthesia; liver injury; potential occupational carcinogen	11.06	

Table 2
Chemical Toxicity and Exposure Information
Boeing Realty Corporation Former C-6 Facility
Los Angeles, California
Page 2 of 2

C.A.S. No.	Contaminant Name (Synonyms)	Appearance & Physical Form (Pure substance)	Odor Threshold ¹⁾	Vapor Pressure	LEL UEL	Cal/OSHA Permissible Exposure Limits (TWA)	STEL CEILING	IDLH	Routes of Entry	Target Organs	Potential Health Effects (Acute & Chronic)	Ionization Potential	Comments
95-47-6	o-Xylene (1,2-Dimethylbenzene; ortho-Xylene; o-Xylol)	Colorless liquid with an aromatic odor	0.05 ppm	7 mmHg	0.9% 6.7%	100 ppm	150 ppm NA	300 ppm	Inhalation, skin absorption, ingestion, skin and/or eye contact	Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys	Irritation to eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis	8.56 eV	
108-38-3	m-Xylene (1,3-Dimethylbenzene; meta-Xylene; m-Xylol)	Colorless liquid with an aromatic odor	0.05 ppm	9 mmHg	1.1% 7.0%	100 ppm	150 ppm NA	300 ppm	Inhalation, skin absorption, ingestion, skin and/or eye contact	Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys	Irritation to eyes, skin, nose, throat; dizziness, excitement, drowsiness, in-coordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis	8.56 eV	
106-42-3	p-Xylene (1,4-Dimethylbenzene; para-Xylene; p-Xylol)	Colorless liquid with an aromatic odor. [Note: A solid below 56°F.]	0.05 ppm	9 mmHg	1.1% 7.0%	100 ppm	150 ppm NA	300 ppm	Inhalation, skin absorption, ingestion, skin and/or eye contact	Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys	Irritation to eyes, skin, nose, throat; dizziness, excitement, drowsiness, in-coordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis	8.44 eV	

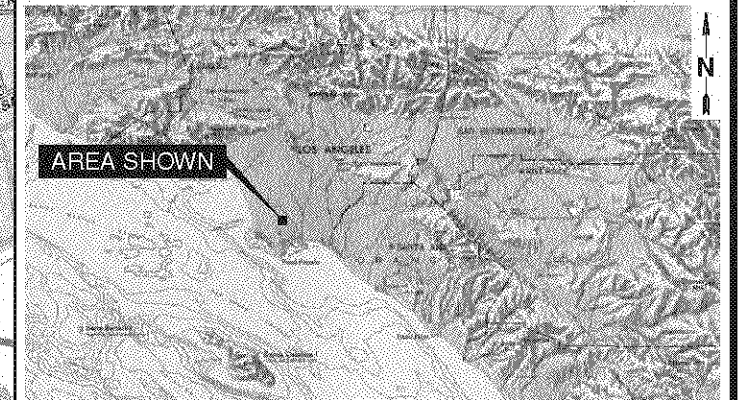
Notes:

ACGIH = American Conference of Governmental Industrial Hygienists
Ca/carc = Carcinog
IDLH = Immediately Dangerous to Life and Health
mg/m³ = milligrams per cubic meter
NA = Not Applicable or Data Not Available
ND = Not Determined
NE = Not Established

NIOSH = National Institute of Occupational Safety and Health
OSHA = Occupational Safety and Health Administration
ppm = parts per million
PEL = Permissible Exposure Limit
STEL = Short Term Exposure Limit (STEL)
TLV = Threshold Limit Value
TWA = Time Weighted Average

¹⁾ Threshold values from Chemical Hazard Response Information System (US Coast Guard)

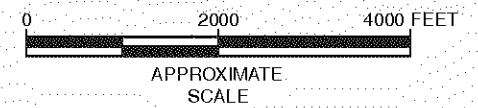
Figures



SITE VICINITY MAP

NOT TO SCALE

REFERENCE:
7.5 MINUTE U.S.G.S. TOPOGRAPHIC
MAP OF TORRANCE, CALIFORNIA
DATED: 1964
PHOTOREVISED: 1981



APPROXIMATE
SCALE

FIGURE 1

SITE LOCATION MAP

FORMER BOEING C-6 FACILITY
TORRANCE, CALIFORNIA



Appendix A

Standard Forms

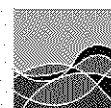
HASP REVIEW

I acknowledge that I have reviewed and understand the requirements of this HASP and agree to abide by the procedures and limitations specified herein. I also acknowledge that I have been given an opportunity to have my questions regarding the HASP and its requirements answered prior to performing field activities. Health and safety training and medical surveillance requirements applicable to my field activities at this site are current and will not expire during on-site activities. All visitors to the site when work covered by this HASP is in progress will be required to sign-in, familiarize themselves with the HASP, and comply with its requirements while in an active work zone. It is Avocet's policy that all visitors must furnish their own personal protective equipment.

Name/Job Title/Company

Date Reviewed

Signature

[illegible]

AVOCET

ENVIRONMENTAL, INC.

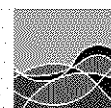
TAILGATE MEETING SIGN-IN SHEET

Boeing Realty Corporation Former C-6 Facility

Los Angeles, California

I certify that I have attended the Tailgate Meeting dated below and understand the hazards that pertain to this site. All of my concerns have been addressed and I have no further questions.

Date of Tailgate Meeting:		Time of Meeting:	
Topic(s):			
<i>Name (Print) and Signature</i>		<i>Company</i>	<i>Comments</i>
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

[illegible]

AVOCET
ENVIRONMENTAL, INC.

Air Monitoring Record

Project No. _____

Activity _____

SITE INFORMATION:

Owner _____

Address _____

City _____

Zip Code: _____

Date of Excavation

MONITORING INFORMATION:

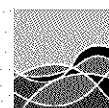
Company Avocet Environmental, Inc.

Name of Person _____

Monitor Mfg. _____

Model No. _____

Calibration Gas

[illegible]

AVOCET
ENVIRONMENTAL, INC.

Avocet Environmental, Inc. Incident/Injury/Illness NEAR-MISS INFORMATION FORM

NOTE: This form is to be used to report ANY Near-Miss Incident/Concern and should be completed and signed by the Employee and given to the Health and Safety Director as soon as possible.
This form may also be dropped in the *COMMENT BOX* located in the employee lunchroom.

Employer: Avocet Environmental, Inc.

Date of Incident: _____

Employee Name: _____

Job Site Name _____ Project Number _____

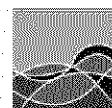
List any unsafe condition, procedure, or near-miss incident that is of concern:

1. List the workplace condition, work practice, or protective equipment that may be contributing to the concern/incident:

2. Is a safety rule being violated? ☐ Yes ☐ No If Yes, which one?

3. Is it an equipment problem: the unsafe condition, practice, or a protective equipment problem?

4. What corrective actions could prevent recurrence of the problem?



AVOCET
ENVIRONMENTAL, INC.

This image shows a full page of blank primary-ruled paper. It features ten sets of horizontal lines across the page. Each set consists of three lines: a solid top line, a dashed middle line, and a solid bottom line. The lines are evenly spaced and extend across the entire width of the page, providing a template for handwriting practice.

[illegible]

Health & Safety Director _____ Dated: _____

Project Manager _____ Dated: _____

☐ Project Manager for project file

Avocet Environmental Incident/Injury/Illness EMPLOYEE REPORTING FORM

NOTE: This form is used to report ANY Incident/Injury/Illness and must be completed and signed by the Employee and given to the Health and Safety Director *within 24 hours* of the Event.

Employer: Avocet Environmental, Inc.

Employee Name: _____

Who did I contact at Avocet Environmental: _____ Date: _____

Job Site Name _____

Project Number _____

1. Date of ☐ Incident ☐ Injury ☐ Illness: ____/____/____: Time _____ ☐ am ☐ pm

2. Name(s) of affected employee(s): _____

3. Work area/job of affected employee(s):

4. Nature of incident, injury, or illness:

5. Parts(s) of body affected (also check boxes on chart below)

6. What workplace condition, work practice or protective equipment contributed to the incident?

7. Was a safety rule violated? ☐ Yes ☐ No If Yes, which one?

8. What corrective actions will prevent recurrence?

9. Was the unsafe condition, practice or protective equipment problem corrected immediately?

☐ Yes ☐ No If No, what has been done?

10. Until corrected, what actions have been taken to prevent recurrence in the interim?

Please note the location of any and all injuries below:

<input type="checkbox"/>	Head	<input type="checkbox"/>	Chest
<input type="checkbox"/>	Eye, Left	<input type="checkbox"/>	Abdomen
<input type="checkbox"/>	Eye, Right	<input type="checkbox"/>	Back, Upper Left
<input type="checkbox"/>	Nose	<input type="checkbox"/>	Back, Lower Left
<input type="checkbox"/>	Ear, Left	<input type="checkbox"/>	Back, Upper Right
<input type="checkbox"/>	Ear, Right	<input type="checkbox"/>	Back, Lower Right
<input type="checkbox"/>	Mouth (Lips, teeth)	<input type="checkbox"/>	Hip, Left
<input type="checkbox"/>	Neck	<input type="checkbox"/>	Hip, Right
<input type="checkbox"/>	Shoulder, Left	<input type="checkbox"/>	Leg, Upper Left
<input type="checkbox"/>	Shoulder, Right	<input type="checkbox"/>	Leg, Lower Left
<input type="checkbox"/>	Arm, Upper Left	<input type="checkbox"/>	Leg, Upper Right
<input type="checkbox"/>	Arm, Lower Left	<input type="checkbox"/>	Leg, Lower Right
<input type="checkbox"/>	Arm, Upper Right	<input type="checkbox"/>	Knee, Left
<input type="checkbox"/>	Arm, Lower Right	<input type="checkbox"/>	Knee, Right
<input type="checkbox"/>	Elbow, Left	<input type="checkbox"/>	Heel, Left
<input type="checkbox"/>	Elbow, Right	<input type="checkbox"/>	Heel, Right
<input type="checkbox"/>	Wrist, Left	<input type="checkbox"/>	Foot, Left
<input type="checkbox"/>	Wrist, Right	<input type="checkbox"/>	Foot, Right
<input type="checkbox"/>	Hand, Left	<input type="checkbox"/>	Toes, Left Foot
<input type="checkbox"/>	Hand, Right	<input type="checkbox"/>	Toes, Right Foot
<input type="checkbox"/>	Fingers, Left hand	<input type="checkbox"/>	
<input type="checkbox"/>	Fingers, Right hand	<input type="checkbox"/>	

Date this form is discussed with Employee _____

COMMENTS: _____

Health & Safety Director _____ Dated: _____

Project Manager _____ Dated: _____

I HAVE READ AND APPROVED THIS FORM:

Employee _____ Dated: _____

NOTE: The results of this investigation will be communicated to affected employees, management and others responsible for follow-up actions.

ORIGINAL: ☐ H&S Director

COPIES TO: ☐ Employee

Date _____ ☐ Project Manager

Avocet Environmental Incident/Injury/Illness Event INVESTIGATION REPORT

Date Notified: _____ Time: _____ ☐ am ☐ pm

☐ Received completed Incident Report from Employee. Date: _____

Employee Name: _____ Job Title: _____

Project Manager: _____

Client: _____

Project Name: _____ Project Number: _____

Type of Event: ☐ Incident ☐ Injury ☐ Illness

_____ Automobile

_____ Personal

_____ Property

_____ Occupational

_____ Subcontractor

_____ Equipment

_____ Near Miss

_____ Other: _____

Reminder: Is this considered a serious event? If yes, Cal/OSHA must be contacted within 8 hours of notification. See EIIPP for Cal/OSHA district office telephone numbers.

Event Information

Date of Event: _____ Approximate Time: _____ Location: _____

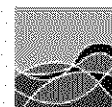
Other Avocet Environmental, Inc. employee(s) involved? _____

Describe the Event: _____

Basic Information

Work being performed at the time of the Event: _____

What procedures were being followed? Are these procedures consistent with the Health & Safety Plan? _____



Description of Events

Employee description of events: _____

Describe cause(s): _____

What workplace condition, work practice or protective equipment contributed to the Event? _____

Was a safety rule violated? If yes, which one? _____

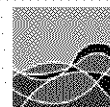
Was the unsafe condition, practice or protective equipment problem corrected immediately? _____

Witness (Name and Address): _____

Telephone Number: _____

Witness Statement: _____

Signature of Witness: _____ Date: _____



Property☐ Yes ☐ No

Describe damage to property: _____

Automobile☐ Yes ☐ No

Automobile description include (make, model, year, color, and VIN number): _____

Description of Injury/Illness☐ Yes ☐ No

Describe injury/illness and cause (See Chart Below): _____

Medical Treatment: _____

Criteria to Determine if an Incident is RECORDABLE in the OSHA 300 Log☐ Yes ☐ No**Per CCR Title 8, Section 14300.7(b) Implementation: A Work-related injury or illness MUST BE RECORDED if it results in one or more of the following:**

Question	Explanation	Answer
(b)(1)(A) Did death result from the work-related injury or illness?	---	<input type="checkbox"/> Yes <input type="checkbox"/> No
(b)(1)(B) Days away from work?	1. Did employee take one or more days off work due to illness/injury?	<input type="checkbox"/> Yes <input type="checkbox"/> No
(b)(1)(C) Restricted work or transfer to another job?	1. Did employee change their normal routine at work due to the Event? 2. Did employee transfer any normal routine activities for part of the day due to the Event? 3. Was there an Avocet-, physician-, employee-imposed restriction on the employee's routine work activities?	<input type="checkbox"/> Yes <input type="checkbox"/> No
(b)(1)(D) Medical treatment beyond first aid?	1. See Avocet Environmental's EIIPP, Section 13 (Step 2) for a comprehensive list of Recordable/Non-Recordable Events.	<input type="checkbox"/> Yes <input type="checkbox"/> No
(b)(1)(E) Loss of consciousness?	1. Verify answer with the employee. 2. Check the doctor/medical records.	<input type="checkbox"/> Yes <input type="checkbox"/> No
(b)(1)(F) Significant injury or illness diagnosed by physician of health care professional?	1. Any other visits to the doctor by the employee? 2. Any other medical reports to review? Check with Sue Hansen to verify receipt of any further medical reports for the Event.	<input type="checkbox"/> Yes <input type="checkbox"/> No

Corrective Actions:

☐ Yes ☐ No

Follow-up on Corrective Actions:

Meeting to Discuss Employee's Report _____ Time _____ ☐ am ☐ pm

Conclusions:

☐ No Further Action

☐ Date Client was informed and by whom? _____

☐ Follow-up Required

☐ Received copy of Client Hazard Notification Form

Corrective Actions determined to prevent recurrence? ☐ Yes ☐ No

If yes, Responsible Person: _____

Date Completed: _____

Signatures

Employee _____

Date: _____

Project Manager _____

Date: _____

Other Signature _____

Date: _____

Other Signature _____

Date: _____

Health & Safety Director _____

Date: _____

ORIGINAL: _____

☐ H&S Director

COPIES TO: _____

☐ Employee

Date _____

☐ Project Manager

IF REPORTABLE: Notification Questions to be Provided to Cal/OSHA

Address where Event Occurred:

Name of person(s) to contact at the Event site:

Telephone: ()

Name and home address of employee:

Nature of Illness or Injury:

Location to which the injured employee was moved:

Identification of any law enforcement agencies present at the site of the Event:

Description of the Event and whether the accident scene or any of the equipment at the scene has been altered:

Appendix B

MSDS and NIOSH Chemical Hazard Sheets

NIOSH Pocket Guide to Chemical Hazards

Benzene		CAS 71-43-2
C₆H₆		RTECS CY1400000
Synonyms & Trade Names Benzol, Phenyl hydride		DOT ID & Guide 1114 130
Exposure Limits	NIOSH REL: Ca TWA 0.1 ppm ST 1 ppm See Appendix A	
	OSHA PEL: [1910.1028] TWA 1 ppm ST 5 ppm See Appendix F	
IDLH Ca [500 ppm] See: 71432		Conversion 1 ppm = 3.19 mg/m ³
Physical Description Colorless to light-yellow liquid with an aromatic odor. [Note: A solid below 42°F.]		
MW: 78.1	BP: 176°F	FRZ: 42°F
VP: 75 mmHg	IP: 9.24 eV	Sp.Gr: 0.88
FLP: 12°F	UEL: 7.8%	LEL: 1.2%
Class IB Flammable Liquid: FLP below 73°F and BP at or above 100°F.		
Incompatibilities & Reactivities Strong oxidizers, many fluorides & perchlorates, nitric acid		
Measurement Methods NIOSH 1500, 1501, 3700, 3800; OSHA 12, 1005 See: NMAM or OSHA Methods		
Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Eyewash, Quick drench		First Aid (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
Important additional information about respirator selection		
Respirator Recommendations NIOSH At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus		
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact		
Symptoms Irritation eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, lassitude (weakness, exhaustion); dermatitis; bone marrow depression; [potential occupational carcinogen]		
Target Organs Eyes, skin, respiratory system, blood, central nervous system, bone marrow		
Cancer Site [leukemia]		
See also: INTRODUCTION See ICSC CARD: 0015 See MEDICAL TESTS: 0022		

[NIOSH Home](#) | [NIOSH Search](#) | [Site Index](#) | [Topic List](#) | [Contact Us](#)


[CDC Home](#)
[CDC Search](#)
[CDC Health Topics A-Z](#)
NIOSH National Institute for
Occupational Safety and Health

[Search NIOSH](#) | [NIOSH Home](#) | [NIOSH Topics](#) | [Site Index](#) | [Databases and Information Resources](#) | [NIOSH Products](#) | [Contact Us](#)

NIOSH Publication No. 2005-151:

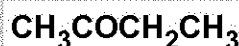
September 2005

NIOSH Pocket Guide to Chemical Hazards

[NPG Home](#) | [Introduction](#) | [Synonyms & Trade Names](#) | [Chemical Names](#) | [CAS Numbers](#) | [RTECS Numbers](#) | [Appendices](#) | [Search](#)

2-Butanone

CAS 78-93-3

RTECS [EL6475000](#)

Synonyms & Trade Names

Ethyl methyl ketone, MEK, Methyl acetone, Methyl ethyl ketone

DOT ID & Guide

1193 127

Exposure Limits

NIOSH REL: TWA 200 ppm (590 mg/m³) ST 300 ppm (885 mg/m³)OSHA PEL†: TWA 200 ppm (590 mg/m³)IDLH 3000 ppm See: [78933](#)Conversion 1 ppm = 2.95 mg/m³

Physical Description

Colorless liquid with a moderately sharp, fragrant, mint- or acetone-like odor.

MW: 72.1

BP: 175°F

FRZ: -123°F

Sol: 28%

VP: 78 mmHg

IP: 9.54 eV

Sp.Gr: 0.81

F.I.P: 16°F

UEL(200°F): 11.4%

LEL(200°F): 1.4%

Class IB Flammable Liquid: F.I.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities

Strong oxidizers, amines, ammonia, inorganic acids, caustics, isocyanates, pyridines

Measurement Methods

NIOSH [2500](#), [2555](#), [3800](#); OSHA [16](#), [84](#), [1004](#)See: [NMAM](#) or [OSHA Methods](#)

Personal Protection & Sanitation (See [protection](#))

Skin: Prevent skin contact

Eyes: Prevent eye contact

Wash skin: When contaminated

Remove: When wet (flammable)

Change: No recommendation

Provide: Eyewash

First Aid (See [procedures](#))

Eye: Irrigate immediately

Skin: Water wash immediately

Breathing: Fresh air

Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 3000 ppm:

(APF = 25) Any supplied-air respirator operated in a continuous-flow mode[£](APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)[£]

(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister

(APF = 50) Any self-contained breathing apparatus with a full facepiece

(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Important additional information about respirator selection

Exposure Routes

inhalation, ingestion, skin and/or eye contact

Symptoms

Irritation eyes, skin, nose; headache; dizziness; vomiting; dermatitis

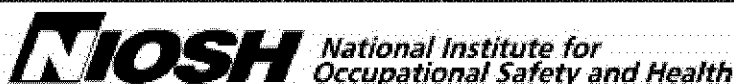
Target Organs Eyes, skin, respiratory system, central nervous system

See also: [INTRODUCTION](#) See [ICSC CARD: 0179](#) See [MEDICAL TESTS: 0133](#)

[NIOSH Home](#) | [NIOSH Search](#) | [Site Index](#) | [Topic List](#) | [Contact Us](#)

NIOSH Pocket Guide to Chemical Hazards

1,1-Dichloroethane		CAS 75-34-3
CHCl₂CH₃		RTECS KI0175000
Synonyms & Trade Names Asymmetrical dichloroethane; Ethylidene chloride; 1,1-Ethylidene dichloride		DOT ID & Guide 2362 130
Exposure Limits	NIOSH REL: TWA 100 ppm (400 mg/m ³) <u>See Appendix C</u> (Chloroethanes)	
	OSHA PEL: TWA 100 ppm (400 mg/m ³)	
IDLH 3000 ppm See: 75343		Conversion 1 ppm = 4.05 mg/m ³
Physical Description Colorless, oily liquid with a chloroform-like odor.		
MW: 99.0	BP: 135°F	FRZ: -143°F
VP: 182 mmHg	IP: 11.06 eV	Sol: 0.6%
FLP: 2°F	UEL: 11.4%	LEL: 5.4%
Class IB Flammable Liquid: FLP, below 73°F and BP at or above 100°F.		
Incompatibilities & Reactivities Strong oxidizers, strong caustics		
Measurement Methods NIOSH 1003; OSHA 7 See: NMAM or OSHA Methods		
Personal Protection & Sanitation (See protection) Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation		First Aid (See procedures) Eye: Irrigate immediately Skin: Soap flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
<u>Important additional information about respirator selection</u> Respirator Recommendations NIOSH/OSHA Up to 1000 ppm: (APF = 10) Any supplied-air respirator Up to 2500 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode Up to 3000 ppm: (APF = 50) Any self-contained breathing apparatus with a full facepiece (APF = 50) Any supplied-air respirator with a full facepiece Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode (APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus		
Exposure Routes Inhalation, ingestion, skin and/or eye contact		
Symptoms Irritation skin; central nervous system depression; liver, kidney, lung damage		
Target Organs Skin, liver, kidneys, lungs, central nervous system		
See also: <u>INTRODUCTION</u> . See ICSC CARD: 0249		


[CDC Home](#)
[CDC Search](#)
[CDC Health Topics A-Z](#)

[Search NIOSH](#) | [NIOSH Home](#) | [NIOSH Topics](#) | [Site Index](#) | [Databases and Information Resources](#) | [NIOSH Products](#) | [Contact Us](#)

NIOSH Publication No. 2005-151:

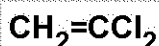
September 2005

NIOSH Pocket Guide to Chemical Hazards

[NPG Home](#) | [Introduction](#) | [Synonyms & Trade Names](#) | [Chemical Names](#) | [CAS Numbers](#) | [RTECS Numbers](#) | [Appendices](#) | [Search](#)

Vinylidene chloride

CAS 75-35-4

RTECS [KV9275000](#)

Synonyms & Trade Names

1,1-DCE; 1,1-Dichloroethene; 1,1-Dichloroethylene; VDC; Vinylidene chloride monomer; Vinylidene dichloride

DOT ID & Guide

1303 [130P](#) (inhibited)

Exposure Limits

NIOSH REL: Ca See Appendix A

OSHA PEL†: none

IDLH Ca [N.D.] See: [IDLH INDEX](#)

Conversion

Physical Description

Colorless liquid or gas (above 89°F) with a mild, sweet, chloroform-like odor.

MW: 96.9

BP: 89°F

FRZ: -189°F

Sol: 0.04%

VP: 500 mmHg

IP: 10.00 eV

Sp.Gr: 1.21

F.L.P.: -2°F

UEL: 15.5%

LEL: 6.5%

Class 1A Flammable Liquid: F.L.P. below 73°F and BP below 100°F.

Incompatibilities & Reactivities

Aluminum, sunlight, air, copper, heat [Note: Polymerization may occur if exposed to oxidizers, chlorosulfonic acid, nitric acid, or oleum. Inhibitors such as the monomethyl ether of hydroquinone are added to prevent polymerization.]

Measurement Methods

NIOSH [1015](#); OSHA [19](#)See: [NMAM](#) or [OSHA Methods](#)

Personal Protection & Sanitation (See protection)

Skin: Prevent skin contact
 Eyes: Prevent eye contact
 Wash skin: When contaminated
 Remove: When wet (flammable)
 Change: No recommendation
 Provide: Eyewash, Quick drench

First Aid (See procedures)

Eye: Irrigate immediately
 Skin: Soap flush immediately
 Breathing: Respiratory support
 Swallow: Medical attention immediately

Respirator Recommendations NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection](#)

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, throat; dizziness, headache, nausea, dyspnea (breathing difficulty); liver, kidney disturbance; pneumonitis; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, central nervous system, liver, kidneys

Cancer Site [in animals: liver & kidney tumors]

See also: [INTRODUCTION](#) See ICSC CARD: 0083

[NIOSH Home](#) | [NIOSH Search](#) | [Site Index](#) | [Topic List](#) | [Contact Us](#)


[CDC Home](#)
[CDC Search](#)
[CDC Health Topics A-Z](#)

**National Institute for
Occupational Safety and Health**
[Search NIOSH](#) | [NIOSH Home](#) | [NIOSH Topics](#) | [Site Index](#) | [Databases and Information Resources](#) | [NIOSH Products](#) | [Contact Us](#)

NIOSH Publication No. 2005-151:

September 2005

NIOSH Pocket Guide to Chemical Hazards

[NPG Home](#) | [Introduction](#) | [Synonyms & Trade Names](#) | [Chemical Names](#) | [CAS Numbers](#) | [RTECS Numbers](#) | [Appendices](#) | [Search](#)

1,2-Dichloroethylene

CAS 540-59-0

CICH=CHCl

RTECS [KV9360000](#)

Synonyms & Trade Names

Acetylene dichloride, cis-Acetylene dichloride, trans-Acetylene dichloride, sym-Dichloroethylene

DOT ID & Guide

1150 [130P](#)

Exposure Limits

NIOSH REL: TWA 200 ppm (790 mg/m³)OSHA PEL: TWA 200 ppm (790 mg/m³)IDLH 1000 ppm See: [540590](#)Conversion 1 ppm = 3.97 mg/m³

Physical Description

Colorless liquid (usually a mixture of the cis & trans isomers) with a slightly acrid, chloroform-like odor.

MW: 97.0

BP: 118-140°F

FRZ: -57 to -115°F

Sol: 0.4%

VP: 180-265 mmHg

IP: 9.65 eV

Sp.Gr(77°F): 1.27

F.I.P: 36-39°F

UEL: 12.8%

LEL: 5.6%

Class IB Flammable Liquid: F.I.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities

Strong oxidizers, strong alkalis, potassium hydroxide, copper [Note: Usually contains inhibitors to prevent polymerization.]

Measurement Methods

NIOSH 1003; OSHA 7

See: [NMAM](#) or [OSHA Methods](#)

Personal Protection & Sanitation (See [protection](#))

Skin: Prevent skin contact
 Eyes: Prevent eye contact
 Wash skin: When contaminated
 Remove: When wet (flammable)
 Change: No recommendation

First Aid (See [procedures](#))

Eye: Irrigate immediately
 Skin: Soap wash promptly
 Breathing: Respiratory support
 Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 2000 ppm:

(APF = 25) Any supplied-air respirator operated in a continuous-flow mode[£](APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)[£]

(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister

(APF = 50) Any self-contained breathing apparatus with a full facepiece

(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection](#)

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, respiratory system; central nervous system depression

Target Organs Eyes, respiratory system, central nervous system

See also: [INTRODUCTION](#) See [ICSC CARD: 0436](#)

[NIOSH Home](#) | [NIOSH Search](#) | [Site Index](#) | [Topic List](#) | [Contact Us](#)

NIOSH Pocket Guide to Chemical Hazards

Lead			CAS 7439-92-1
Pb			RTECS OF7525000
Synonyms & Trade Names Lead metal, Plumbum			DOT ID & Guide
Exposure Limits	NIOSH REL*: TWA 0.050 mg/m ³ See Appendix C [*Note: The REL also applies to other lead compounds (as Pb) -- see Appendix C.]		
	OSHA PEL*: [1910.1025] TWA 0.050 mg/m ³ See Appendix C [*Note: The PEL also applies to other lead compounds (as Pb) -- see Appendix C.]		
IDLH 100 mg/m ³ (as Pb) See: 7439921		Conversion	
Physical Description A heavy, ductile, soft, gray solid.			
MW: 207.2	BP: 3164°F	MLT: 621°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 11.34
F.I.P: NA	UEL: NA	LEL: NA	
Noncombustible Solid in bulk form.			
Incompatibilities & Reactivities Strong oxidizers, hydrogen peroxide, acids			
Measurement Methods NIOSH 7082, 7105, 7300, 7700, 7701, 7702, 9100, 9105; OSHA ID121, ID125G, ID206 See: NMAM or OSHA Methods			
Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: Daily Remove: When wet or contaminated Change: Daily		First Aid (See procedures) Eye: Irrigate immediately Skin: Soap flush promptly Breathing: Respiratory support Swallow: Medical attention immediately	
Important additional information about respirator selection Respirator Recommendations NIOSH/OSHA Up to 0.5 mg/m ³ : (APF = 10) Any air-purifying respirator with a high-efficiency particulate filter/(APF = 10) Any supplied-air respirator Up to 1.25 mg/m ³ : (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a high-efficiency particulate filter Up to 2.5 mg/m ³ : (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece Up to 50 mg/m ³ : (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode Up to 100 mg/m ³ : (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus			
Exposure Routes inhalation, ingestion, skin and/or eye contact			
Symptoms Lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation eyes; hypotension			
Target Organs Eyes, gastrointestinal tract, central nervous system, kidneys, blood, gingival tissue			
See also: INTRODUCTION See ICSC CARD: 0052 See MEDICAL TESTS: 0127			

NIOSH Pocket Guide to Chemical Hazards

Methyl chloroform		CAS 71-55-6	
CH₃CCl₃		RTECS KJ2975000	
Synonyms & Trade Names Chloroethene; 1,1,1-Trichloroethane; 1,1,1-Trichloroethane (stabilized)		DOT ID & Guide 2831 160	
Exposure Limits	NIOSH REL: C 350 ppm (1900 mg/m ³) [15-minute] See Appendix C (Chloroethanes)		
	OSHA PEL†: TWA 350 ppm (1900 mg/m ³)		
IDLH 700 ppm See: 71556		Conversion 1 ppm = 5.46 mg/m ³	
Physical Description Colorless liquid with a mild, chloroform-like odor.			
MW: 133.4	BP: 165°F	FRZ: -23°F	Sol: 0.4%
VP: 100 mmHg	IP: 11.00 eV		Sp.Gr: 1.34
F.L.P.: ?	UEL: 12.5%	LEL: 7.5%	
Combustible Liquid, but burns with difficulty.			
Incompatibilities & Reactivities Strong caustics; strong oxidizers; chemically-active metals such as zinc, aluminum, magnesium powders, sodium & potassium; water [Note: Reacts slowly with water to form hydrochloric acid.]			
Measurement Methods NIOSH 1003 See: NMAM or OSHA Methods			
Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation		First Aid (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately	
<u>Important additional information about respirator selection</u> Respirator Recommendations NIOSH/OSHA Up to 700 ppm: (APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus			
Exposure Routes inhalation, ingestion, skin and/or eye contact			
Symptoms Irritation eyes, skin; headache, lassitude (weakness, exhaustion), central nervous system depression, poor equilibrium; dermatitis; cardiac arrhythmias; liver damage			
Target Organs Eyes, skin, central nervous system, cardiovascular system, liver			
See also: INTRODUCTION. See ICSC CARD: 0079 See MEDICAL TESTS: 0141			

[NIOSH Home](#) | [NIOSH Search](#) | [Site Index](#) | [Topic List](#) | [Contact Us](#)

NIOSH Pocket Guide to Chemical Hazards

Trichloroethylene			CAS 79-01-6
ClCH=CCl ₂			RTECS KX4550000
Synonyms & Trade Names Ethylene trichloride, TCE, Trichloroethene, Trilene			DOT ID & Guide 1710 160
Exposure Limits	NIOSH REL: Ca See Appendix A See Appendix C		
	OSHA PEL†: TWA 100 ppm C 200 ppm 300 ppm (5-minute maximum peak in any 2 hours)		
IDLH Ca [1000 ppm] See: 79016		Conversion 1 ppm = 5.37 mg/m ³	
Physical Description Colorless liquid (unless dyed blue) with a chloroform-like odor.			
MW: 131.4	BP: 189°F	FRZ: -99°F	Sol(77°F): 0.1%
VP: 58 mmHg	IP: 9.45 eV		Sp.Gr: 1.46
FLP: ?	UEL(77°F): 10.5%	LEL(77°F): 8%	
Combustible Liquid, but burns with difficulty.			
Incompatibilities & Reactivities Strong caustics & alkalis; chemically-active metals (such as barium, lithium, sodium, magnesium, titanium & beryllium)			
Measurement Methods NIOSH 1022, 3800; OSHA 1001 See: NMAM or OSHA Methods			
Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench		First Aid (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately	
Important additional information about respirator selection Respirator Recommendations NIOSH At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus			
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact			
Symptoms Irritation eyes, skin; headache, visual disturbance, lassitude (weakness, exhaustion), dizziness, tremor, drowsiness, nausea, vomiting; dermatitis; cardiac arrhythmias, paresthesia; liver injury; [potential occupational carcinogen]			
Target Organs Eyes, skin, respiratory system, heart, liver, kidneys, central nervous system			
Cancer Site [in animals: liver & kidney cancer]			
See also: INTRODUCTION See ICSC CARD: 0081 See MEDICAL TESTS: 0236			

[NIOSH Home](#) | [NIOSH Search](#) | [Site Index](#) | [Topic List](#) | [Contact Us](#)

NIOSH Pocket Guide to Chemical Hazards

o-Xylene			CAS 95-47-6
C6H4(CH3)2			RTECS ZE2450000
Synonyms & Trade Names 1,2-Dimethylbenzene; ortho-Xylene; o-Xylol			DOT ID & Guide 1307 130
Exposure Limits	NIOSH REL: TWA 100 ppm (435 mg/m ³) ST 150 ppm (655 mg/m ³)		
	OSHA PEL†: TWA 100 ppm (435 mg/m ³)		
IDLH 900 ppm See: 95476		Conversion 1 ppm = 4.34 mg/m ³	
Physical Description Colorless liquid with an aromatic odor.			
MW: 106.2	BP: 292°F	FRZ: -13°F	Sol: 0.02%
VP: 7 mmHg	IP: 8.56 eV		Sp.Gr: 0.88
Fl.P: 90°F	UEL: 6.7%	LEL: 0.9%	
Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.			
Incompatibilities & Reactivities Strong oxidizers, strong acids			
Measurement Methods NIOSH 1501, 3800; OSHA 1002 See: NMAM or OSHA Methods			
Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation		First Aid (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately	
Important additional information about respirator selection Respirator Recommendations NIOSH/OSHA Up to 900 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)/(APF = 10) Any supplied-air respirator/(APF = 50) Any self-contained breathing apparatus with a full facepiece Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus			
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact			
Symptoms Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis			
Target Organs Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys			
See also: INTRODUCTION See ICSC CARD: 0084 See MEDICAL TESTS: 0243			

[NIOSH Home](#) | [NIOSH Search](#) | [Site Index](#) | [Topic List](#) | [Contact Us](#)

NIOSH Pocket Guide to Chemical Hazards

m-Xylene		CAS 108-38-3	
C ₆ H ₄ (CH ₃) ₂		RTECS ZE2275000	
Synonyms & Trade Names 1,3-Dimethylbenzene; meta-Xylene; m-Xylol		DOT ID & Guide 1307 130	
Exposure Limits	NIOSH REL: TWA 100 ppm (435 mg/m ³) ST 150 ppm (655 mg/m ³)		
	OSHA PEL†: TWA 100 ppm (435 mg/m ³)		
IDLH 900 ppm See: 95476		Conversion 1 ppm = 4.34 mg/m ³	
Physical Description Colorless liquid with an aromatic odor.			
MW: 106.2	BP: 282°F	FRZ: -54°F	Sol: Slight
VP: 9 mmHg	IP: 8.56 eV		Sp.Gr: 0.86
Fl.P: 82°F	UEL: 7.0%	LEL: 1.1%	
Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.			
Incompatibilities & Reactivities Strong oxidizers, strong acids			
Measurement Methods NIOSH 1501, 3800; OSHA 1002 See: NMAM or OSHA Methods			
Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation		First Aid (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately	
Important additional information about respirator selection Respirator Recommendations NIOSH/OSHA Up to 900 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)/(APF = 10) Any supplied-air respirator/(APF = 50) Any self-contained breathing apparatus with a full facepiece Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus			
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact			
Symptoms Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis			
Target Organs Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys			
See also: INTRODUCTION See ICSC CARD: 0085 See MEDICAL TESTS: 0243			

[NIOSH Home](#) | [NIOSH Search](#) | [Site Index](#) | [Topic List](#) | [Contact Us](#)

NIOSH Pocket Guide to Chemical Hazards

p-Xylene		CAS 106-42-3
$C_6H_4(CH_3)_2$		RTECS ZE2625000
Synonyms & Trade Names 1,4-Dimethylbenzene; para-Xylene; p-Xylol		DOT ID & Guide 1307 130
Exposure Limits	NIOSH REL: TWA 100 ppm (435 mg/m ³) ST 150 ppm (655 mg/m ³)	
	OSHA PEL†: TWA 100 ppm (435 mg/m ³)	
IDLH 900 ppm See: 95476		Conversion 1 ppm = 4.41 mg/m ³
Physical Description Colorless liquid with an aromatic odor. [Note: A solid below 56°F.]		
MW: 106.2	BP: 281°F	FRZ: 56°F
VP: 9 mmHg	IP: 8.44 eV	Sp.Gr: 0.86
FLP: 81°F	UEL: 7.0%	LEL: 1.1%
Class IC Flammable Liquid: FLP at or above 73°F and below 100°F.		
Incompatibilities & Reactivities Strong oxidizers, strong acids		
Measurement Methods NIOSH 1501, 3800; OSHA 1002 See: NMAM or OSHA Methods		
Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation		First Aid (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
Important additional information about respirator selection Respirator Recommendations NIOSH/OSHA Up to 900 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)/(APF = 10) Any supplied-air respirator/(APF = 50) Any self-contained breathing apparatus with a full facepiece Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus		
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact		
Symptoms Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis		
Target Organs Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys		
See also: INTRODUCTION See ICSC CARD: 0086 See MEDICAL TESTS: 0243		

[NIOSH Home](#) | [NIOSH Search](#) | [Site Index](#) | [Topic List](#) | [Contact Us](#)